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JANUARY, 1916

No. 265



FACULTY OF FORESTRY

Winter

JAN 1

THE WHITE OAK

The American Forestry Association

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Declaration of Principles and Policy of *The* American Forestry Association

IT IS A VOLUNTARY organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.

IT IS INDEPENDENT, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.

IT ASSERTS THAT forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.

IT DECLARES THAT FORESTRY is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars' worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.

IT RECOGNIZES THAT forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.

IT WILL DEVOTE its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies

Federal Administration and Management of national forests; adequate appropriations for their care and management; Federal cooperation with the States, especially in forest fire protection.

State Activity by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners; non-political departmentally independent forest organization, with liberal appropriations for these purposes.

Forest Fire Protection by Federal, State and fire protective agencies, and its encouragement and extension, individually and by cooperation; without adequate fire protection all other measures for forest crop production will fail.

Forest Planting by Federal and State governments and long-lived corporations and acquirement of waste lands for this purpose; and also planting by private owners, where profitable, and encouragement of natural regeneration.

Forest Taxation Reforms removing unjust burdens from owners of growing timber.

Closer Utilization in logging and manufacturing without loss to owners; aid to lumbermen in achieving this.

Cutting of Mature Timber where and as the domestic market demands it, except on areas maintained for park or scenic purposes, and compensation of forest owners for loss suffered through protection of watersheds, or on behalf of any public interest.

Equal Protection to the lumber industry and to public interests in legislation affecting private timberland operations, recognizing that lumbering is as legitimate and necessary as the forests themselves.

Classification by experts of lands best suited for farming and those best suited for forestry; and liberal national and State appropriations for this work.

AMERICAN FORESTRY

The Magazine of the American Forestry Association

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January, 1916. Vol. 22

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THE DAY OF NO TIMBER

Is farther away now than the ultra-conservationists ten years ago said it was when they spread an alarm of exhausted supply.

THE theory of exhaustion has been dismissed. Wood is still abundant. It is still and always will be the warm, friendly material that makes four walls a cosy cottage or a magnificent mansion. Our regard for it is inherent. Our children will continue to use it because its adaptability, beauty of finish and sound absorbing qualities give it a home-making charm that no other material possesses.

AND the uses of wood are multiplying phenomenally. We are just now coming to know its real values and save them. Practical by-product utilities that represent more than 60 per cent of the usable value of trees are now known, in addition to lumber which utilizes only one-third. Others will be found. With added use there is added worth.

LUMBER need not go higher in cost to consumer to make profitable for all time the ownership of timber. Forest protection, new uses, close utilization, efficient management and economical distribution will constantly add to the value of stumpage and eclipse the "overhead." Stumpage—the raw material—will take the gain.

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The American White Oak

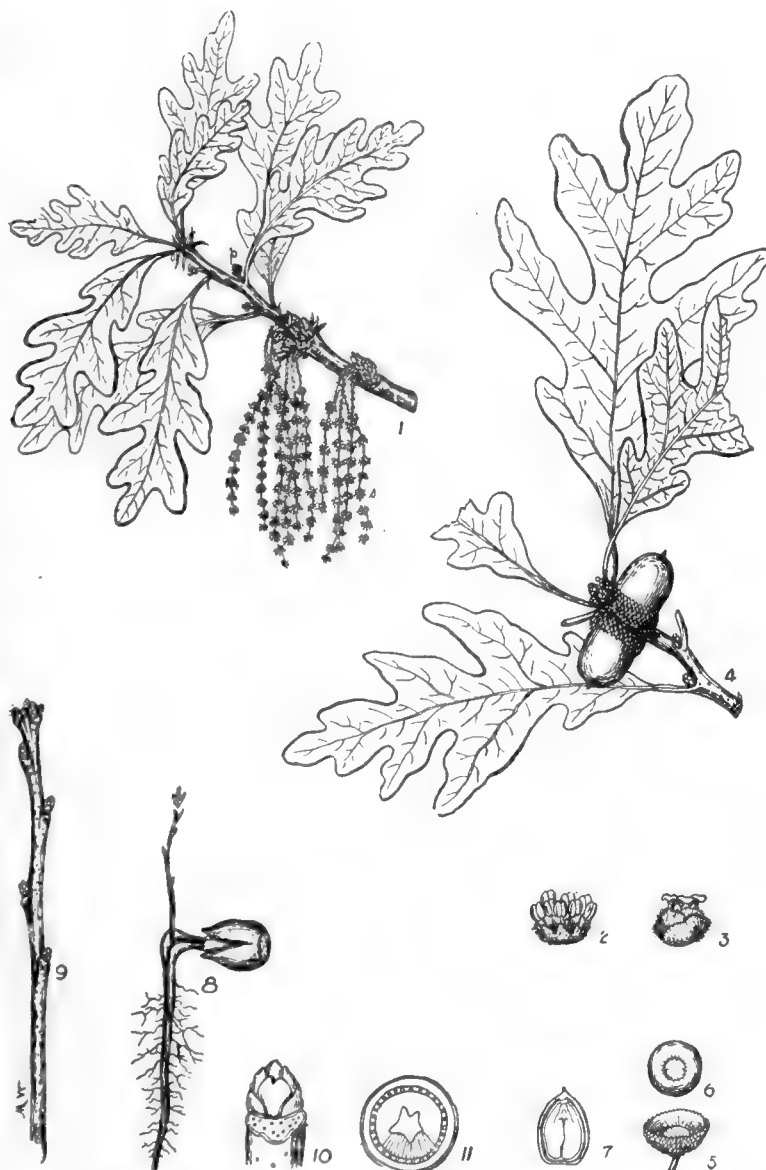
Identification and Characteristics

BY S. B. DETWILER

THE oak possesses a sentimental charm for mankind, perhaps because in days of old, it was closely associated with worship of the gods. Instinctively we venerate its character as symbolic of strength, permanence and independence. In Europe and America are many historically famous oaks, and the poets from Virgil to Longfellow have celebrated "Jove's own tree."

Our high regard for the oaks does not depend alone on sentiment, since the value of the wood, bark and acorns rank these trees commercially as our most important hardwood. In the "Faëry Queen," Spencer speaks of "The builder oak, sole king of forests all," in referring to the use of oak in the enduring structures of past ages.

Nearly 300 species of oak are known in the northern hemisphere; about 55 are native to North America, and more than half of them are commercially important. Lumbermen and botanists agree in recognizing natural divisions of the oaks into two



From *Pennsylvania Trees*, by J. S. Illick.

THE WHITE OAK

1. Flowering branch with immature leaves showing the (s) staminate blossoms and (p) the pistillate blossoms.
2. A staminate or pollen bearing flower, enlarged.
3. A pistillate or seed bearing flower, enlarged.
4. Branch with full-grown leaves and acorns, about one-half size.
5. Acorn cup, about one-half size.
6. The base of the acorn.
7. The cross-section view of the acorn.
8. Germinating acorn with its young root and shoot.
9. A winter branch.
10. The end of a winter branch showing the bud with the overlapping scales, a leaf scar with bundle scars and lenticels enlarged.
11. Cross-section of twig showing five-sided pith, the wood with medullary rays and the inner and outer bark enlarged.

classes. The species in the white oak group ripen their acorns in one year, the leaf margins are free from bristles, and the bark and wood are usually light colored. The red or black oak group requires two years to mature their fruit, the leaves have sharp, bristle-like points on the margins, and the bark and wood are darker in color than in the white oak group.

The white oak is our most important oak and is one of the most widely distributed and most used hardwoods in the United States. It grows from Maine to central Ontario and Minnesota, south to Florida and Texas. It is most abundant and best developed in the central Mississippi and lower Ohio basins, and on the western slopes of the Allegheny Mountains.

Forest grown white oak has a long clean trunk that tapers very little until it branches into a comparatively narrow top. It may attain a height of 150 feet, with a trunk 8 feet in diameter, free of branches for 60 feet or more. Usually the trees



TRUNK OF A WHITE OAK

The bark of a mature tree like this is about two inches thick. It is usually light grey or white, shallowly fissured into flat, irregular scales often very loosely attached. Occasionally the bark appears roughly ridged and without scales. On the smaller branches the bark is light green to reddish-brown.

are 2 to 4 feet in diameter and 60 to 100 feet in height. In the open trunk is short, often of large size; the top forms an impressive dome with many great branches, gnarled and twisted, that convey the idea of sturdiness and strength.

The bark of the mature trunk is a pale gray, with shallow fissures and flaky scales. Occasionally it is roughly ridged or plated, and without scales, and may vary in color from dark grey to nearly white.

The pith of the twigs is shaped like a five-pointed star. The bark of young twigs is light green or reddish-tinged, changing in winter to reddish-brown or grey, and is covered with numerous small, raised breathing pores.

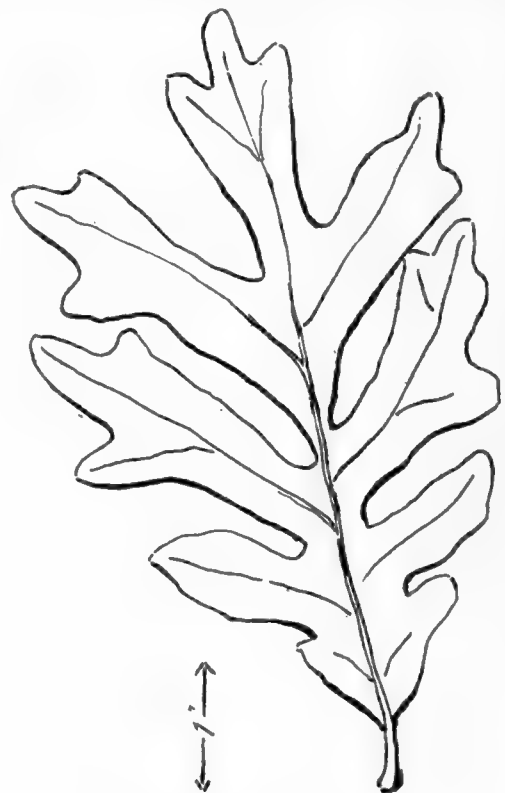
The buds stand singly on the sides of the twigs. If a line is drawn from bud to bud, it will be seen that each fifth bud stands directly above the one from which counting begins, and the line forms a spiral of two turns around the stem. Several buds are clustered at the ends of the twigs. All of the buds are small, blunt-pointed and more or less globular, and are covered with tiny overlapping scales.

The leaves are 2 to 4 inches wide, 5 to 9 inches long and have an egg-shaped outline, with the broad end farthest from the branch. The base of the leaf is wedge-shaped, with a short stem. The edge of the leaf is cut by rounded notches into divisions or lobes, ranging in number from 3 to 9, but usually 7. The top of each lobe is rounding and free from bristles. Sometimes the indentations are very slight, giving the margin of the leaf a wavy outline, in other cases they extend nearly to the mid-rib of the leaf.

The leaves unfold late in the spring. The pioneer planted his corn when the white oak leaf had opened to the size of a mouse's ear. At first the leaves are a delicate rose-pink, and covered with silvery down. When full grown they are bright green and smooth above, pale, smooth and occasionally shiny beneath. For a short time late in the autumn the color of the foliage changes to mingled shades of subdued reds and purples. Soon the color fades and the leaves become brown and sear but often remain clinging to the branches, especially on young trees, until the winds of winter finally whirl them away.

In May, when the leaves are about one-third grown, two kinds of flowers appear on the branches. The pollen-producing flowers are in clustered catkins that droop, fringe-like, from the branches. These flowers are yellowish, and inconspicuous. Each one of the flowers which produce the acorns appears to be composed of a number of tiny reddish scales from which three bright red tips protrude. They are borne singly or several on one stem, in the axils of the leaves. At first very small, after they are fertilized by the pollen they develop into a nut, the familiar acorn.

The acorn matures early in the fall. The bowl-shaped cup encloses about one-fourth of the nut and is covered with numerous brown scales. The nut is light brown, shiny, about one-third of an inch long, and rounded at the tip. The white meat of the nut is much sweeter in flavor than most acorns and is a staple food for squirrels, wild turkeys, hogs and other animals, wild and domestic. Even the Indians and the early colonists ate white oak acorns, after first boiling them. Seed years for white oak



Courtesy of Manual Arts Press.

LEAF OF THE WHITE OAK

The leaves are from five to nine inches long, two to four inches wide, with three to nine, but usually seven, ascending lobes; when full grown they are thin and bright green above and pale and smooth below.

occur every 4 to 7 years, when the yield of mast is heavy. In other years the crop is light.

White oak can maintain itself on any soil except cold, wet land with an impenetrable subsoil, but it prefers the deep, rich and porous loam soils of bottom lands, flats, coves and gentle lower slopes. It may form practically pure forest, but is usually mixed, in groups or single trees, with chestnut, tulip poplar, red oak, beech, basswood, and occasionally with hemlock and white pine.

White oak grows more slowly than red oak at first, but growth is uniform and persistent. Average growth in the forest is one inch in diameter, and 5 to 8 feet in height in ten years. Even under the better conditions of a well cared for plantation, it requires from 125 to 200 years to reach maturity. White oak trees under forest conditions do not bear seed until from 40 to 80 years old. The acorns roll down steep slopes to a considerable distance from the tree; squirrels, chipmunks, crows and jays are also active in distributing them.

It is probable that not more than one acorn out of every ten in the forest escapes destruction by animals, insects and fires. The acorn germinates in the fall. It first sends a strong tap root deep into the soil, and the part of the tree above ground grows very slowly for a number of years until a strong, branching root system is developed.

In planting for timber production, white oak is less valuable than red oak, because of its slow growth. On account of the deep tap root, it is difficult to transplant young white oaks successfully, and better results are obtained by planting the acorns where the trees are to grow permanently. Nuts should be collected from middle-aged trees. There are about 100 acorns to a pound of seed, or about 9,000 to a bushel. If care is taken to secure acorns that are free from insects, a bushel of seed will produce about 7,500 trees. About 12 bushels of acorns per acre will be required for broad-cast sowing. A better method is to drop the acorns in shallow furrows, or plant them in spaces cleared with a grub hoe, about 6 feet apart. They should be covered with 2 or 3 inches of soil. Mixed plantings of white oak with white pine, white ash or red oak will give better results than pure planting.

Young seedlings will grow for a few years under dense shade.

but they soon die if deprived of an abundance of light. For this reason, the forester encourages the growth of young oaks by thinning out less valuable trees. Forest fires are the chief enemy of white oak in the forest or plantation. These destroy the leaf litter and humus which nature provides to hold the moisture in the forest soil, and they also cause scars at the bases of the trees. In consequence, the vitality of the trees is weakened, inviting attack by insects and wood rotting fungi. Its most destructive insect enemy is the oak timber worm or pin worm. Several fungi are active in causing heart rot, or dot. White oak trees may also occasionally suffer injury from wind shakes and frost cracks.

White oak is a valuable tree to plant for ornamental purposes, provided it has plenty of space and good soil for its development. It does not thrive under the adverse conditions of street planting nearly so well as red oak or pin oak, and because of its spreading habit, it is better



A FINE WHITE OAK SHADE TREE

In summer one can distinguish the White Oak very readily by its loose scaly, grayish or white bark from which it takes its common name and by its deeply round-lobed leaves with a smooth and pale lower surface when mature. In winter it has some characteristics apparently in common with some other oaks but can be distinguished from the Red, Black, Scarlet, Chestnut and Yellow Oaks by its obtuse, rather small buds; from the Swamp White Oak by the slender, reddish to grayish twigs and the absence of dark, loose peeling flakes on the branches; from the Post Oak by the absence of greenish rusty pubescence on the twigs; from the Pin Oak by the absence of stiff lateral pins on the branches and the more obtuse buds; from the Bur Oak by the absence of corky wings on the branches. In addition to these characteristics the acorns and leaves which often persist will aid considerably in recognizing the different species.



THE AREA OF WHITE OAK

The white oak is tolerant of many soils, growing on sandy plains, gravelly ridges, rich uplands and moist bottom lands. It reaches its best development in rich, moist soil.

suiting to large estates or the open country. It is a noble tree and might frequently be planted to advantage where faster growing species are chosen. Although it grows slowly, it is very interesting to watch the development of a white oak growing in the open. In comparatively few years it begins to show its characteristic form, that in time becomes magnificent and impressive. It is a tree that will be enjoyed not only by the planter but by his children and his children's children.

The wood of white oak is the most valuable of all oaks. It is ash grey in color, close-grained, hard and tough. It weighs about 46 pounds per cubic foot and has exceptional strength. It is durable in the soil. The average life of a white oak railroad tie is 8 to 9 years, and as a fence post the wood lasts 10 to 15 years. Unlike the wood of red oak, it will absorb very little creosote. In the open air the

wood shrinks considerably and is liable to check badly unless carefully dried. Its most important uses are for sawed lumber, railroad ties and staves.

Settlements commenced in the United States in the parts where the oak was most abundant. The colonists encountered the wood as soon as they landed in this country. It was less abundant in New England and in the extreme south than in the middle colonies; yet there was oak in New England and it extended to Florida. It is said that the "Charter Oak" in Connecticut was a white oak; and the fact that it was hollow to a sufficient extent to afford concealment for the precious document, and that it stood 200 years after that time, is proof of the strength of oak and of the tenacity with which it holds out against enemies within and without.

The settlement and development of the country were made possible—at any rate were made easier—by liberal use of the splendid forests of oak. This wood more than any other fenced the farms of the pioneers, built their houses, barns, dams, mills, and bridges; supplied charcoal for forge and furnace, and fuel for the winter fires throughout the hardwood regions of the United States. The chroniclers of early explorers and colonizers abound in praises of valuable oak. The Anglo-Saxon entered the American wilderness looking for land and he learned that the oak guided to the best. The pine was on the sand, but the oak's preemption of the humus soils was fairly complete. The dairies, journals, and biographies of such experienced and observing woodsmen as Christopher Gist, Daniel Boone, Isaac Van Meter, and General Washington show how much confidence they placed in oak timber as a guide to rich land, while searching for locations for settlements and colonies, or while exploring routes for trade.

Commercial Uses of White Oak

WHITE OAK in the United States, it is believed, exceeds in quality any other hardwood, but no figures are available showing the total amount of the wood remaining. Estimates based on partial measurements have placed it at 50 billion feet. Assuming that to be within reason, it is possible to calculate within rather wide limits the length of time it will last at the present rate of cutting. In 1910 the total sawmill output of all oaks in this country was 3,522,098,000 feet, board measure. Staves and hewn railroad ties would probably bring the total up to four billion feet. Statistics are not compiled in form to show species of oak separately, but perhaps one-half, or two billion feet is white oak, and that represents the annual drain upon the country's supply of that species.

On that basis the white oak will not hold out much longer than twenty-five years.

High prices and the increasing difficulty of filling orders for first-class stock indicate that scarcity is already felt. No extensive virgin white oak forests remain to be exploited; but small virgin bodies of this timber exist

in some of the Appalachian Mountain States, and west of the Mississippi, but they become smaller and fewer year by year, while the demand for white oak increases.

When the early pioneer located a site for a cabin he called upon the oak for service, and it answered his call. Its logs, hewn or round, built his house. The building was roofed with clapboards rived from a tree felled in his dooryard. Oak puncheons, often untouched by broadax or adz, formed the door, floor, latch, beds, benches, and the chimney. The loft floor, when there was one, was laid of thinner puncheons or thicker clapboards; for the line between the two kinds of commodities was not definitely fixed. Choice trunks, mauled into rails, fenced the land on which they had grown. White oak, more than any other wood, was shaped for rough vehicles, such as ladder sleds, log sleds, block-sleds, carts, and thimblekeins wagons. The frames of harrows and sometimes the teeth were of oak. It was the wood of which the moldboards of plows were fashioned, also the beam, handles, the whiffletrees, singletrees, and all else pertaining to the plow except the point and

cutter. It was the wood for oxboes, sandspikes, and levers. Farmers made feed troughs and licklogs of it for horses and mules. It was selected because of its hardness. The animals did not gnaw it to pieces as they did troughs of softer woods. For a similar reason it was made into corn and wheat bins, because such bins were seldom gnawed through by rats. It was the principal material for flax brakes in early times when nearly every house had one, and tow linen was manufactured by hand in most cabins. The old flax brake has held its ground to this day in some of the isolated regions of the southern Appalachian mountains. Inventors have patented nearly three hundred machines for breaking flax, and still the old style, crude, white oak contrivance is not entirely obsolete. The fly of the old Bradford printing press, the first in New York, was of white oak, and it has survived the



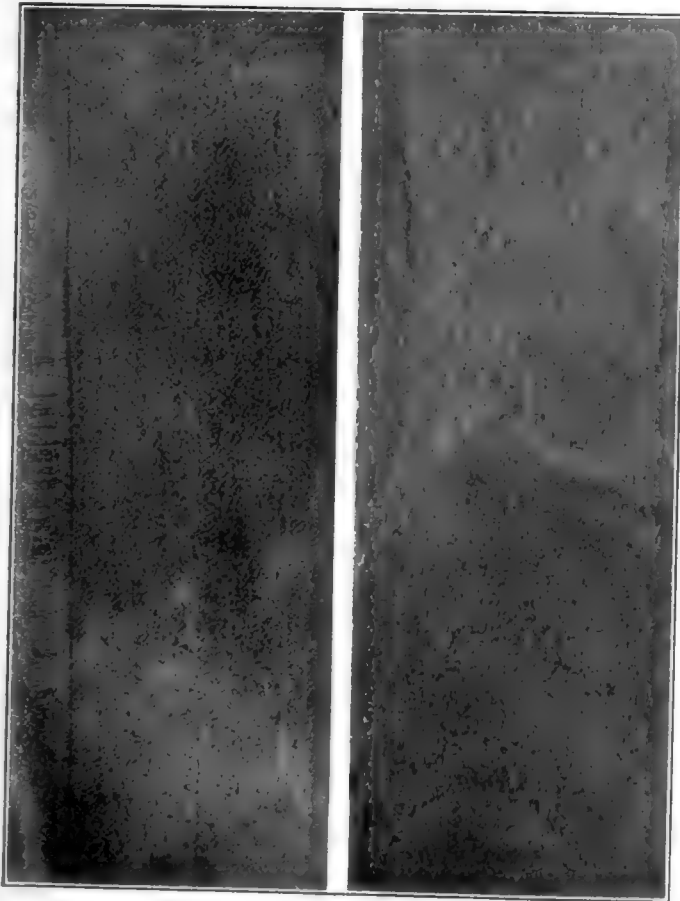
SHIP AND BOAT BUILDING

A century ago in building large vessels wood was the most important and valuable material used, but the substitution of steel construction has progressed so rapidly that at the present time the use of wood in this class of boats is only incidental, answering principally for decking, interior finish, ships' furniture, masts, spars, booms, etc. For smaller boats, however, such as yachts, launches, row boats, canoes and other pleasure craft, wood is still the raw material used. White oak is extensively employed for keels, ribs, stern posts, stems and in some instances for coaming for open cockpit boats and interior trim for cabin boats.

vicissitudes of time though long ago retired from active service.

The frontier wheelwrights and wagon makers drew heavily upon oak when they had the boundless wilderness to choose from with full license to take what they would. The chucking wagons which sustained their maker's reputation and their own on the rutted roads and rocky hills in early times, were oak-hubs, spokes, felloes, hames, bolsters, axles, standards, sandboards, and tongues. Lighter vehicles in late years brought hickory in, but the everlasting wagons of the frontiers were oak. The staunch felloes sustained the tires, which were in two or more pieces, and were bolted on. Wagons of that kind, strong as gun carriages, were made in Pennsylvania and in the South Branch Valley in Virginia, and they carried across the Allegheny Mountains the military supplies which accompanied Washington's ill-fated expedition to the Great Meadows in 1754, and Braddock's more disastrous one the next year. Those were the first wheeled vehicles to cross from the Atlantic slope to the drainage basin of the Mississippi River. Oak wheels trundled in the van of civilization's march toward the West in the early as well as in later years.

The homemade pack saddles and stirrups, with which horses were equipped for forest trails, were usually oak. Furniture was made of it centuries before quarter-sawing was invented and before stains and fillers for deepening the tones were thought of, or ammonia fumes were known. When whipsaws and the rude sawmills began to supplant the broad ax, oak became a frame material for houses. Massive old residences of New



WHITE OAK

Tangential or bastard cut, in which the pith rays appear as interrupted dark vertical lines of different lengths. These should not be confused, however, with the vessels or pores which show as short vertical dotted lines seen also in the radial section.

Radial or quarter sawed section, the pith rays showing as conspicuous large flakes or irregular size. It is this so-called "silver grain" which makes quarter sawed white oak so attractive and desirable as a finish wood.



PLANING MILL PRODUCTS

In house and other lines of building construction considerable attention is given to floors, those of hardwood generally being preferred. Both red and white oak are used indiscriminately for this purpose, together with maple and beech. Hardwood flooring is usually $\frac{3}{8}$ inch thick, 1 inch to $2\frac{1}{2}$ inches wide and both end and side matched. It is most often laid the same as standard flooring, except that a sub-floor of some soft wood is laid diagonally below it with deadening material between. For certain classes of floors, such as those of offices, show windows and stores, the parquetry designs are preferred. In such instances numerous other hardwoods which contrast in color are employed for borders.

England, New York, and farther south were frequently of that wood. Some of the venerable structures are standing yet, and their stability wins the admiration of all who see them.

Numerous instances of the enduring properties of white oak might be cited, but a few will suffice. The Westfall blockhouse, which was built in Tygart's Valley, Virginia, now West Virginia, as a defense against Indians in 1774, stood one hundred thirty-two years, and when torn down, its white oak logs showed few points of decay. In 1776, John Minear, a German from Pennsylvania, built a milldam in the same region, and a century afterwards the oak logs had decayed so little that the hewer's ax marks were clearly seen. The oak logs in which portholes were cut, in the blockhouse now standing in the center of Pittsburgh, on the site of Fort Duquesne, were remarkably well preserved though exposed to weather during nearly one hundred fifty years. White oak logs from Fort Henry, on the Ohio River, at Wheeling, under whose walls was fought "the last battle of the Revolution," September 11, 1782, were manufactured into picture frames one hundred six years after the fort was built. Most of the old warehouses in lower New

York, which were destroyed in the great fire of 1855, were of white oak cut in New Jersey at an early day.

The manufacture of white oak into salable commodities began very early in the history of America. Europe has but one commercial oak, and the first colonists in this country were surprised to find so many here, yet they knew but a small part of the total number. They were not slow in determining the best, and they picked white oak. For all practical purposes it was equal to the English oak, and being so much more abundant, and consequently cheaper, it soon formed portions of cargoes bound for the trans-Atlantic ports. A record exists of a shipment of oak panels from New York to Holland, in 1626. Sawmills were at work near the Hudson river one hundred sixty years before the first one on record appeared in England. Some of the American mills of a very early date operated from four to twelve saws, and at least one of the mills was built for wind power. One of the earliest commodities to go to Europe from the New World in considerable amounts was lumber. Most of it was white pine, some was red cedar, a little was sassafras, but part of it was oak felled in the valleys of the Hudson and the Delaware. The oversea lumber

trade was small in the first years, but it was one of the largest items in the earliest commerce. It was a peculiar circumstance that while rough lumber was going from American to England, dressed, cut, and fitted material for houses was occasionally shipped from England to America, accompanied by carpenters to put the material together upon arrival here. Some houses of that kind were built in Maryland.

Tight cooperage staves, which were nearly always of white oak, were among the first forest products of the United States. How much experimenting the first settlers did before they learned the value of white oak as a container for liquors is not known, but they were early in possession of the knowledge and made practical use of it. Various commodities were stored and shipped in the barrels made of American white oak, but some of the best of the wood was for the fine wines of the Canary Islands. The claim was then made and has since been often insisted upon that the wine was improved by long storage in oak casks. The users of barrels strongly insisted on having white oak, and the drain on convenient supplies was so heavy that experienced men declared years before the beginning of the nineteenth century that the supply could not last much longer. A New York trade committee in 1795 suggested reforesting old fields to provide oak for the future. Long before that time measures had been taken in New Jersey looking to the regulation of the stave trade. In 1713 an export duty of \$7.50 per 1,000 was laid on pipes and \$5 on hogsheads. Four years later the duty was taken off, but was replaced in 1743 and remained until the Revolution.

Oak barrels at the present day frequently cross the ocean more than once. Some go to Russia where they are used as containers of oil, and these never come back. Others carry liquors to France, Italy, Spain, Turkey, and even Arabia. After they are emptied of their contents, they are refilled with wines of those countries and returned to America. When they have been emptied of their wines in this country they are frequently filled with vinegar and shipped once more. English ale is often shipped in American barrels.

White oak wood absorbs a considerable amount of the spiritous liquors in the barrels. When they are emptied it is found profitable to drive the alcohol from the wood in a specially constructed distillery where hot steam is the agent. The alcohol thus obtained is of high grade, worth \$100 a barrel. A single distillery in New Jersey



VEHICLES AND VEHICLE PARTS

Oak stands second in importance among the woods used for this industry, red and white oak being employed in about equal proportion. White oak enters into the manufacture of vehicle body frames and gear parts. The photograph shows oak spokes piled for seasoning in the plant of a large spoke and hub manufacturer.

is said to pass 250 old whiskey barrels a day through the hot steam process.

Barrels for alcoholic liquors are not the only white oak output of cooperage shops. Pork, oil, molasses, and many other kinds of barrels are manufactured. Some of these do not require the highest grade of oak, and staves of other kinds of wood are in use. The principal advantage of white oak over other woods, in addition to its strength, is that the wood is dense and seepage through the pores of the wood is very small. Barrels of a certain wood may hold one liquid with little leakage, and be entirely unfit for others. The dense summer wood, which forms a large part of the annual rings of growth of white oak, is the part of the wood which makes it exceptionally valuable for tight cooperage. The liquids can not seep through.

Small oak staves in early times were made into numerous vessels other than barrels, such as tubs, kegs, churns, and well buckets. The latter use was common. A bucket of that kind dips easily on account of its weight. "The Old Oaken Bucket," of Samuel Woodworth's well-

known poem, was probably made of Massachusetts white oak.

Salt barrels are made, and for a century have been made principally of white oak staves with hickory hoops. Two sizes are used, one of 280 and the other of 350 pounds. In Tennessee, and perhaps elsewhere as well, white oak trees, about ten inches in diameter, are worked into hoops for tobacco hogsheads. Only the sapwood and a little of the adjacent heart will answer the requirements. Smaller trees are useless and larger ones are too brittle.



FURNITURE

White oak is an important furniture wood, and supplies nearly 50 per cent of the total quantity of raw material used in this industry annually. The picture shows oak rocking chair parts ready for assembling.

BRIDGES AND PILING

In situations alternately wet and dry, white oak is one of the best obtainable woods. The long service which it gives has increased its use for piles, piers, wharfs, quays, seawalls, bulkheads, wingwalls, booms, milldams, forebays, aqueducts, penstocks, and headgates. The superstructure of wharfs and bridges, which are the parts always above water, are preferably of lighter wood than oak, but the cribs and piles on which the superstructure rests have more frequently been built of oak than of any other wood in regions where oak could be conveniently had.

Oak formed the keels, ribs, planking, and other heavy lower timbers of early American ships, white pine the masts, and other woods filled various places. Boston yards preferred white oak pins or treenails, but most others used locust. The gallic acid in the oak stained the wood if iron bolts were substituted for treenails, and prejudice against iron for that purpose was nearly universal, though evidence was wanting to show that the wood was hurt by the stain. At the present time iron bolts have nearly displaced treenails of all kinds of wood in ship building. English boat builders supplied their yards with American white oak, while insisting that European oak was better. The knees for large vessels

were usually of live oak, but were sometimes hewed from natural crooks, or roots of white oak. That was before the art of bending to the required shade was understood.

The increased use of iron and steel in modern ship building has not driven wood from that industry, though many vessels are constructed with comparatively little wood. The uses of white oak about the boat yard are many. It enters into planking, keels, and hulls. Canal boat bottoms are made of it, though the upper parts may be of Douglass fir, southern pine, or some other species which affords long timbers. Modern passenger vessels, though principally of steel, employ white oak in large quantities for interior finish.

Two hundred years ago in New England and New York, builders used it for its strength—and used much more than was necessary; but the modern architect and builder employ it for its beauty. They now put in beams and braces of cheaper material to give the necessary strength and stability to the structure; and they work the oak to produce artistic effects. Color schemes for finish are studied; and with stains, fumes, and fillers, attractive combinations are made which were once totally unknown to the house builder.

As a hardwood flooring material, white oak is second only to sugar maple in quality. It is worked into parquet flooring as well as the ordinary tongued and grooved pattern. Some of the finest floors are of quarter-sawn, but oak of that kind is commonly reserved for panels, wainscoting, beams, and columns. Oak mantels are one of the luxuries of modern houses. The stair is another piece of indoor architecture where the wonderful wealth and variety of the white oak's grain, figure, and color may be shown to excellent advantage. The newel posts, railing, spindles, steps, and capitals give the opportunity to display the fine finish of oak from every angle. Baseboards, grilles, blinds, picture molding, and curtain poles, add to the display of a well-finished interior of oak.

Houses were once roofed with oak shingles and clapboards, but that is seldom done now, although 20 million oak shingles were manufactured in the United States in 1907. Few of them were white oak.

Quarter-sawing became popular about 1885. By tilting the log in the process of converting it into lumber, the cut is made radially, that is, on a line from the heart to the sap. That cuts the medullary rays in such a way that their broad surfaces are exposed to view. These are the "mirrors" of oak—the bright patches which are so much admired in well-selected wood. Quarter-sawing opened a new era for oak. It was a wasteful method of manufacturing lumber, but prices were good.

The manufacture of fixtures calls for the highest grades of white oak, because it is a class of work meant largely for show, and no inferior material will pass. Fixtures, as the term is here used, include counters, show cases, saloon bars, built-in tables, desks, and partitions in banks, wall cabinets for stores, and other large cabinets. In no class of work can the massive beauty of oak be displayed to better advantage.

About one-fourth of all the furniture now made in the

United States is white oak. The substantial chairs, bedsteads, bureaus, and tables, which were once made by hand by rural workman before the modern factory with its machines was known, are now classed as antiques, but age has added to their value. Few fillers and finishers were then employed, and the natural grain of the wood remained unchanged. Solid oak furniture is not often made now, except the cheapest or the most expensive kinds. Common chairs, bedsteads, and tables are low priced, and of plain-sawed material; and expensive, deeply carved pieces are solid, because only thick, solid wood will display the carvings. The medium-priced oak furniture is practically all veneered.

Chair making is an industry almost separate and distinct from the manufacture of furniture, and while many woods are employed, oak is the most important. Chair factories often make nothing else, and they turn out large numbers of standard patterns, some very cheap, others of better grade.

Strength fits oak for certain kinds of musical instruments, and beauty for others. While oak figures in the manufacture of guitars, melodeans, orchestrions, and in racks and cabinets which form the furniture and equipment of the music room; but the most massive oak is seen in pipe organs for halls and churches.

White oak is not a handle wood to the same degree that hickory is, but it is much employed for certain kinds of handles. In some parts of the Atlantic coast it is used as ax handles. It is toughened for that service by boiling it in oil. The sapwood of saplings only is used, as the heartwood is too brash, and even the sapwood of large trees will not do.

Oil tanks of white oak are specially preferred, because the oil is liable to seep through most other woods. Enormous oak tanks were built in the oil fields of Pennsylvania and West Virginia in the early days of the development of oil fields in that region.

White oak out on the hills of Maryland was serving as cross-ties before the locomotive came on the scene. The first railroad out of Baltimore, aiming for the Ohio River, was operated by horsepower, and the short, cast-iron rails were nailed down on white oak timbers. Eighty years ago it came to the front as tie material, and it has held its place against all rivals. It serves other railroad purposes equally well. It makes the enormous bumping posts at track ends; beams in car frames which receive jerks and impacts; frame posts, spring blocks, pilot beams, log-car bunks, cattle stops, car seats, and the interior wood work of passenger coaches.

It is possible to extend much further the classes or groups of commodities in the manufacture of which white oak is used, but that would only accentuate the fact that the wood approaches universal use more nearly than any other of this country, or of any country. It is employed in dimensions large and small; ribbons for basket weavers, and columns for halls and balconies; runners and cross pieces for toy sleds, and beams for cold storage doors; wood for cheese boxes, pulleys in machine shops, water wheels, road scrapers, merry-go-



TIGHT COOPERAGE

White oak is the premier wood in this industry, and is used almost to the exclusion of all other woods as raw material in the manufacture of staves and heading for high grade barrels, kegs and casks and other containers of wines and liquors, for both foreign and domestic use.

rounds, saddle trees, whip handles, sucker rods for oil wells as a substitute for hickory, ten pines, caskets and coffins, bench screws, elevator cages, spring bars, water gates for mills; neck yokes for roguish horses and rolling hoops for playful children.

(Much of the information in this article was secured by courtesy of the United States Forest Service.)

FOREST KING FALLS

THE Nehalem, Oreg., forests have lost a king. A giant spruce tree that is estimated to be nearly 4,000 years old has fallen a victim to the havoc of a storm. This representative of the earliest of Oregon trees measured some 19 feet at the point where it was broken. Throngs continue to visit this fallen wonder of wonders, and not a few have attempted to count the numberless rings by which its age is computed by scientists.

At Watseco, Oreg., a huge cedar tree holds a place of honor among the attractions. It is 17 feet in diameter, and is said to be about 2,000 years old.

The Nehalem country claims some unequalled records for the age of Oregon native trees. The violence of the gales sweeping up into the God's Valley district have laid low many woodland lords.

The Sequoia National Park

BY MARK DANIELS

Ex-General Superintendent of National Parks

THERE are few who have not suffered attacks of wanderlust. In some it takes a disguised form and calls for consultation to arrive at the proper diagnosis. In others that strange seasonal restlessness can be recognized at once, without the aid of so much as a thermometer, as the itching foot, as it is called out West. Whether the desire to roam the earth is prompted by an instinct inherited from our nomadic forbears or by those local conditions which so frequently make travel advisable, it is certain that once the desire is temporarily gratified the disease becomes permanent and can be cured only by amputation.

Of the numerous and varied types of attractions which lure the weary business man with waking dreams of travels in other climes, three seem to be possessed of a

charm of singular virulence—the sea, the desert and the mountains. Perhaps it is because in these three widely different fields we find that nature, in her sublime simplicity, leads us back with steady hand to that closer relation with the Creator which childhood's dreams are made of. Perhaps it is that in great expanse men's souls stretch out and the veil of human pettiness is sometimes lifted. Whatever may be the reason, it is certain that once a deeper draught of either of these three cups is taken, there ensues a thirst for more that knows no quenching.

About the sea I cannot speak with knowledge born of personal experience, but I have never known a deep-sea sailor who had breathed the breath of the ocean deep into his lungs who could put the longing for the sea entirely out of his heart. As for the desert and the



Photo by Mark Daniels.

LOOKING WEST FROM MT. WHITNEY

This view is from the point on the upper slopes of the great mountain known as The Chimney. Near Mt. Whitney are four great canyons, one of which is half a mile deeper than the canyon of the Colorado in Arizona, and many forests of the giant Sequoias.



AN UNNAMED LAKE

These sparkling gems are legion in number in the southern Sierras. Some are hidden in forest glades, others glisten like jewels in their platinum settings of perpetual snow; all are a delight to the traveler. This one, so well worthy of a name but as yet unchristened, is near Agnew Meadows, Sequoia National Park.

mountain tops, I can speak with the feeling of one who has been bitten by the bacillus, for I have roamed through ranges and deserts afoot, astride the trusty jackass, aboard the grumbling mule and clinging to the saddle horn of a bucking cayuse, and that longing for the desert's expanse and the crisp air of lofty peaks is always with me. Nor is my case unique, for every year sees some gray-haired retired miner whose suddenly acquired wealth necessitates his stealing stealthily from the route of fashionable places to shade his eyes for one more lingering look at the shimmering desert that yielded him her treasures. Each spring finds an ever-increasing throng turning toward the mountains for another sight of verdant forests and snow-clad peaks.

For those whose predilections are for mountain crags, forest glades and echoing canyons, there is perhaps no place more replete with such features than Sequoia Park and the surrounding territory. Situated at the southern end of the Sierra Nevada in California, the area covered by the National Park and contiguous national forests includes Mt. Whitney, the highest peak in the United States, four great canyons, one of which is one-half mile deeper than the canyon of the Colorado in Arizona, and

many forests of *Sequoia Gigantea* in one of which is the greatest and oldest tree on earth.

Roughly speaking, this area is fifty miles wide and sixty miles long as the crow flies. Traversing the northerly half and flowing in a westerly direction are the middle and the south forks of the King's River. The former stream is in one place seven thousand feet below the upper rim of its canyon, and while the walls are not vertical as in the Colorado, it flows through the deepest canyon in the world and is a most impressive sight. Separating the drainage area of the King's from the Kern is the King's-Kern Divide, a jagged range that lies to the south and generally parallels the south fork of the King's River. From the park line east this wonderful spur, together with the Sphinx Crest, forms an all but impassable barrier between the King's and Kern, and to the traveler its many spires beckon the enthusiast to essay its ascent for a peep at the world beyond. But the bleaching bones of a sturdy burro will testify to the futility of such an attempt, at least at the place where I endeavored to pass through. There are, of course, two or three passes which can be traversed on foot and which could be made safe for animals by a little judicious trail building.



THE KERN DOMES, KERN RIVER CANYON, CAL.

Overlooking the famous canyon these peaks are a notable feature of the wall which shuts in the almost level floor of the canyon. These walls are not so vertical nor so systematically shaped as those of the Yosemite but in places they rise to an altitude of over three thousand feet above the river.

Across the King's-Kern Divide about two miles west of its junction with the crest of the High Sierra is a trail that connects the King's River Canyon with the Kern River Canyon and crosses at Harrison Pass. It is possible to take animals over this pass, but hardly advisable. Construction work is now being performed on the trail over the pass and a safe and easy passage for animals is assured for next season.

The Kern River has its source in the almost countless number of small lakes and mountain tarns which nestle around the upper bases of the peaks which form the Kern-King's Divide and the main ridge of the Sierra Nevada from Junction Peak south. The Kern flows in an almost due south direction, practically at right angles with the direction of the South Fork of the King's. To the east of the great Kern Canyon the main ridge of the Sierra Nevada bars the passage to the famous Owens River valley and to the west the great Western Divide separates the Kern from the Kaweah. With the Sphinx Crest and King's-Kern Divide running in an easterly and westerly direction, the Great Western Divide and the main ridge of the High Sierra running parallel to one another in a northerly and southerly direction, each with its lofty peaks and serrated crest silhouetted against the

sparkling azure skies, the country is divided into three sections each of which is a riot of beauty and a wonderland well calculated to fascinate the camper and mountain climber and banish from his mind all thoughts of time.

To attempt to describe the entire area would at least indicate a monumental conceit on the part of even the greatest of writers. To attack the task of an adequate description of even a smaller section must, to those who have traversed this country, appear presumptuous; but at least I may indicate some of the beauties which may be encountered on a trip crossing the Great Western Divide, the Kern Canyon and the main range of the Sierra Nevada. Perhaps the most fortunate circumstance, in connection with this rugged and broken country, is the fact that there are certain trails which lead one along canyon floors, swinging around great bluffs and over high passes with astonishingly little danger.

The orthodox port of entry to this land of enchantment is the small town of Vasalia in Tulare County, California, where, amongst other attractions offered by the general locality, one may secure enchiladas, frijoles and Spanish chicken prepared and served in a manner that justifies the claim to a true Spanish origin. If the traveler is so fortunate as to dine upon one of these old Mexi-

can mysteries, the disagreeable elements which he may encounter in the automobile trip from Visalia to the Giant Forest in Sequoia National Park will be ameliorated by the pleasant recollection of his repast.

The road to the Giant Forest, after crossing the plain, strikes the Kaweah River and follows up the Little Valley and Canyon to the junction of the Middle and North Forks. There it crosses the River and follows the North Fork of the Kaweah, climbing gradually above it to the

Divide. There are few roads in the world which possess such an inspiring view as may be seen from Administration Point on the Park road.

From Administration Point on to the Giant Forest the view of the Middle Fork Canyon is secured only now and then. Most of the road passes through the Forest. The giant trees which are in the vicinity of the camp so far eclipse all conceptions of the marvelous that thoughts of the canyon view are banished.



A LIGHTNING ROD OF THE HIGH SIERRA

This is University Peak as seen from Kearsage Pass, near the Kings River Canyon, California. It lies to the north of Mt. Whitney and is called one of the lightning rods of the mountains. Its rock-ribbed summit and sides have been struck by lightning countless times without much apparent damage.

Park entrance. From the Park entrance the road is on a steady upward grade and swings around points of the south shoulder of the Ash Peaks to the Old Colony Mill where the first view of Moro Rock and the valley of the Middle Fork of the Kaweah bursts through the screen of trees in a breath-taking way that shocks their observation into alert attention. At this point the road is on the north rim of the Middle Fork Canyon and just beyond Old Colony Mill, at Administration Point, rises to about 3,500 feet above the stream which may be seen threading its way like quicksilver down the canyon. Straight ahead is Moro Rock with its domelike summit rising over 4,000 feet above the river below. In the background some twelve miles away is the crest of the Great Western

The Giant Forest, which constitutes the terminus of the wagon road, surrounds a camp, some studios, the post-office and the Park Ranger station. The peace and restfulness of this group of monarchs pervades the camp and constrains the small group of tourists to speak in humble and softer tones. I have never known anyone to enter this wonderful group en route to the back country who did not abandon thoughts of speedy passage to linger beneath the branches and amongst the towering shafts of these trees which were 3,000 years old when Christ was born. As a matter of fact there is sufficient beauty and glory within a radius of five miles from this camp to justify the stay of the most bored of tourists for several weeks.

In this district are the only groves of *Sequoia Gigantea* which are receding themselves to any marked extent, and there are in the Sequoia Park alone over one million trees of the species. They are not scattered throughout or evenly distributed as is so frequently the case of pine forests, but are spotted in groups and groves in certain locations. To the northwest of the Giant Forest, a distance of about eight miles, is the Muir Grove. About three miles from the camp is another group of big trees

It is amusing to see the tenderfoot tourist attempt to photograph a Giant Sequoia. There is nothing sufficiently approximating these trees in size within reasonable distance. As a result, the scale is almost lost and until one has spent some time in their midst the true proportions of them are not realized. The tourist, to whom their presence is strange, will frequently attempt to photograph them from a distance of 100 feet or so, but he begins to step backwards gingerly, glancing from time to time at



Photo by Mark Daniels.

FRANKLIN LAKE

Florence Peak is in the background and the author photographed his friends as they were admiring the wonderful setting of the beautiful mountain lake. This is on the Great Western Divide near Mt. Whitney.

near Halstead Meadows, and to the east, a distance of about seventeen miles by trail, and just outside the Park, is a grove of big trees at Redwood Meadows. Scattered along the trail from the Giant Forest to the Redwood Meadows in several places may be found small groves and isolated specimens. The sensation with which one confronts a Giant Sequoia defies description, though many have essayed the task. There is that subconscious feeling of standing in the presence of the oldest living thing on earth whose centuries of life have gathered about it a mysterious force that may be felt by all observers. But think of traveling through a forest of such trees! Think of passing from their sombre shadows into the sparkling sunlight and back again beneath the shaggy branches of another grove!

his finder, until he comes to a realization of the fact that if he can place enough distance between his lense and the tree to enable him to take in the trunk up to the first branches without intervening obstruction, he will be most fortunate. At first sight one is inclined to assume the attitude of the farmer who after a prolonged gaze at a hippopotamus ejaculated, "Hell, there ain't no such animal." Perhaps the only ones who have had the tremendousness of these trees deeply impressed upon them are those who have been confronted with the task of hewing them down. As an illustration of their size: The General Sherman, which is the largest tree, is 279 feet high, 36½ feet in diameter and is estimated to contain 1,000,000 feet of lumber board measure. When it is considered that this is equiva-

lent to the amount of timber that is cut from about forty acres of average Minnesota timberland, some conception, at least, of the cubic contents of this tree can be secured.

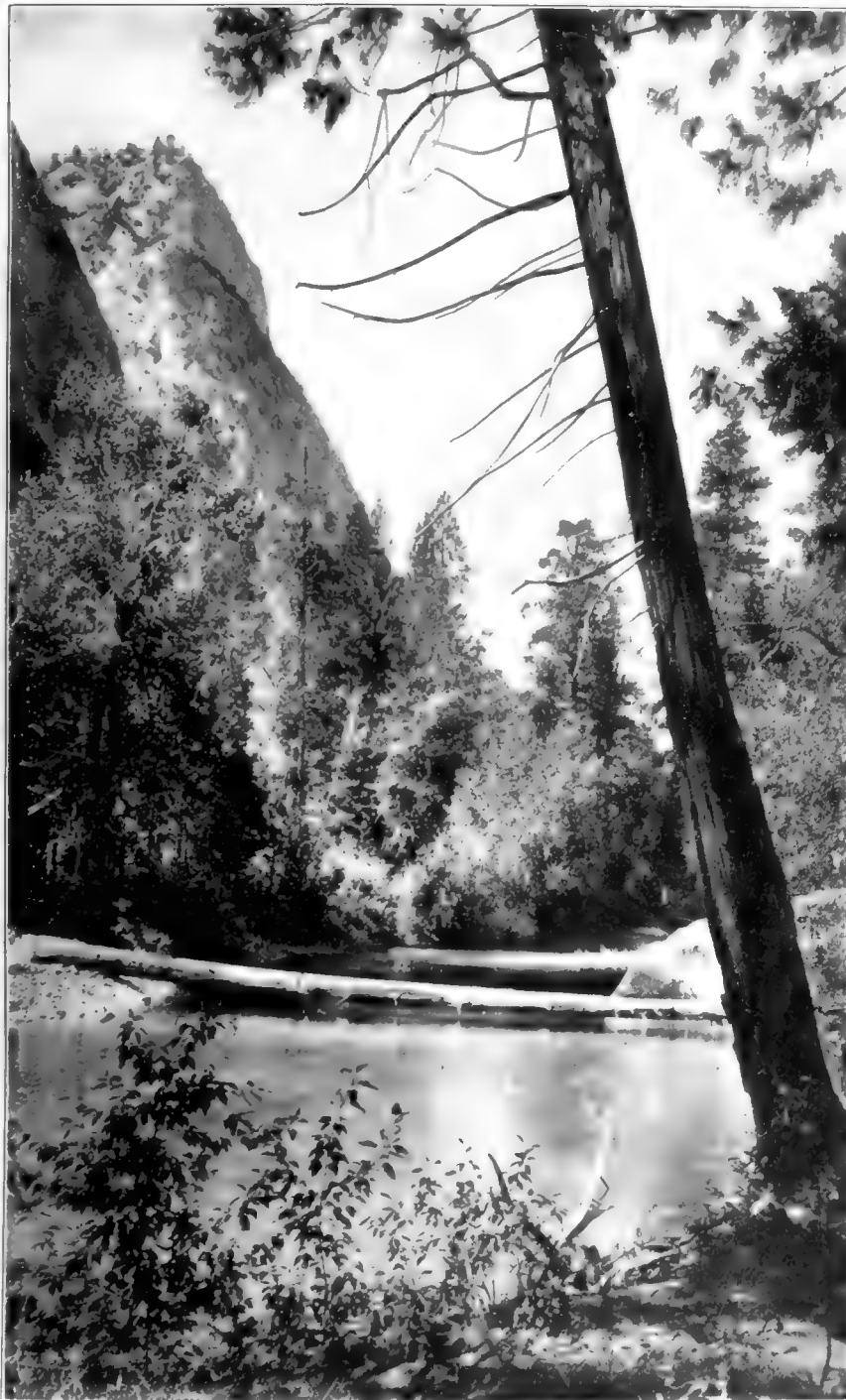
If an early start is made by saddle animal and pack train, the distance from Giant Forest to Redwood Meadows may be comfortably traversed in one day, and along the route an ever-changing view of the great canyon of the Middle Fork of the Kaweah presents itself, first on one hand and then the other, as the trail swings around points down into small ravines and up over projected plateaus.

At Redwood Meadow there is a grove of Sequoias which would seem to have been placed for the special delectation of the night camper. They encircle an open space in which has been constructed a crude table and fireplace so situated that one may still make his bed within the charmed circle without being too close to the kitchen. The energetic attentions of the forest rangers (for this is outside the Park and in the National Forest) keeps removed to a reasonable distance the earmarks of former occupants, which, in spite of the requests of posted signs, are ever evident in the form of empty cans which mark the wake of the tenderfoot. To lie beneath the open sky in this enchanted circle and gaze up at the stars, which seem to be seen as from the

bottom of a well, is a privilege that is granted only to those who eschew the beaten paths of tourist travel, but it is one the attainment of which justifies great sacrifice.

From Redwood Meadow there are two routes which may be followed to reach the Great Canyon of the Kern; one trail follows Cliff Creek over the Great Western Divide by Columbine Lake into Lost Canyon, and thence down the Big Arroyo over the end of the Chagoopa Plateau and down the canyon walls to the Kern River;

the other continues along Deer Creek over Timber Gap to Mineral King, from which two other routes are available, one crossing Farewell Gap and leading to Soda Spring on the Kern River, the other crossing the great western divide near Franklin Lake over Franklin Pass just north of Florence Peak and down the Rattlesnake to the Kern River. Perhaps the most interesting route of any is the one which zigzags back and forth, crossing the great western divide at Coyote Pass, entering the lower end of the Kern Canyon at Soda Springs. This route develops eighteen miles of trail on the floor of the Kern Canyon and takes in practically the entire length of that portion which is confined between precipitous walls. It is not, however, so picturesque as the route over Franklin Pass and cuts out the fascinating trail down Rattlesnake Creek,



THE GRAND SENTINEL

This impressive peak is aptly named. It watches over the river that washes its base in moods varying from the placid stream of autumn to the raging torrent of early spring.

although it does avoid the steep and difficult trail which drops from the rim of the canyon to the floor at the junction of Rattlesnake Creek with the Kern.

On the Franklin Pass Trail the summit of the great western divide is attained at the disputed elevation of 11,300 feet. From this pass the first view of the great range of the higher Sierra is secured. It is stunning, breath taking. The

great peaks from Langley to Barnard, including Le Conte, Muir, Whitney and Russell, all peaks 14,000 feet or over, stand out in startling array against the eastern sky. The range that is stretched before you is really the great western divide, but these mountains were first climbed from the west and the range of peaks, of which Florence Peak just to the south of Franklin Pass is one, was supposed to have been the great western divide and was so named. It was not until some time after that the higher crest of the Sierra Nevada was discovered, probably just in such a manner as it is discovered each year by those upon whose vision it bursts for the first time from Franklin and similar passes of the western ridge. It is a

bit confusing to find the lower ridge named the great western divide, while the main crest of the Sierra Nevada, with its towering peaks, is the true divide.

It is difficult to leave Franklin Pass with the vast panorama of mountain peaks and canyons stretching on all sides, but the trail down Rattlesnake Canyon traverses a country so new and different from that over which the trail to this point has led that the regrets are of short duration. To me Rattlesnake Canyon and the Siberian outposts, about twenty miles further along the trail, are

the two most fascinating features of this district. Rattlesnake Creek lies between great walls of granite which, about half way down the creek, are over 2,000 feet in height and almost vertical. The bottom of the canyon, however, is for the most part wide and comparatively level, carpeted here and there with meadows which are threaded by the sparkling waters of the creek. Perhaps it

is the contrast between the moss and grass covered floor and the barren rock and disintegrated granite of the pass which adds such charm to that portion of the trail which leads through Rattlesnake Canyon, but in addition to this, there is an undeniable and a very distinctive character to the formation of the canyon walls, which makes this bit of trail stand out in one's memory. There are more colors in the granite of the walls and they are also sculptured in such a way as to cast interesting shadows and carry spots of sunlight. The charm of the canyon casts its spell over even the dumb, as is evidenced by the profusion of those reptiles that have given the creek its name. Exercising alertness for the wily snake adds a soupçon of interest, as it were.



Photo by Mark Daniels.

THE KERN RIVER

This stream rises in the hundreds of small lakes around the upper bases of the peaks which form the Kern-Kings Divide and the main ridge of the Sierra Nevada. It flows almost due south. This view of it was taken near Funston Meadow.

The descent from the upper rim of the Kern Canyon to the floor is the most tedious portion of this wonderful trail. The zigzags back and forth seem countless in number and the trail endless. At each turn one expects to find the river within a stone's throw, but after fifteen or twenty have been made, the river is still as far as ever. The drop is about 1,800 feet, at every 100 of which the patient mule cranes his neck astern and reproaches humanity with a pained expression and pleading eye. The trail finally emerges, however, upon the broad grass-



Photo by Mark Daniels.

THE KINGS-KERN DIVIDE

This is the view west from Kearsage Pass and looking over into Bullfrog Lake. From this picture some idea of the lightning-torn peaks of the Great Western Divide may be obtained.

covered floor of the canyon where flows a real river abounding in jumping trout.

From this point to the head of the Kern Canyon is twelve miles and there are good camping places along the entire distance. The floor of the canyon is comparatively level, though the trail here and there climbs up over piles of talus, as if to give a clearer view up and down the river. The walls of the canyon are not so vertical as those of the Yosemite nor are they so symmetrically shaped, but in places they rise to an altitude of 3,000 feet or more above the river. Riding through this canyon is almost like a morning's ride in a city park, with everything visible magnified many times. The trail crosses the river at Funston Camp just above the junction of the Big Arroyo and the Kern and the crossing must be negotiated by fording. From this point on the variety of trees is one of the fascinations. Cedar, pine, quaking aspen, and that most beautiful of trees, the gnarled and picturesque juniper, are grouped and blended by the Master-hand with a skill that defies duplication and drives the chill of discouragement deep into the soul of the landscape gardener. The canyon is alive with bird life. On one trip I saw Nuttall woodpeckers, red-breasted sap suckers, California woodpeckers, the Cassin King bird, fly catchers, jays, orioles, wood warblers, and a wonderful western tanager, flashing through the filtering sunlight arrayed in his scarlet, black and gold plumage.



Photo by Mark Daniels.

ON WHITNEY'S PEAK

Stephen T. Mather, third assistant to Secretary of the Interior Lane, who has charge of the National Parks, and Emerson Hough, the well-known writer, on top of Mt. Whitney.



THE HIGHEST PEAK IN THE UNITED STATES

This is Mt. Whitney in southern California, and for all its distinction as the highest mountain in this country it is most easy of ascent and from this point of view not at all impressive. From its summit may be seen the town of Tom Pine, two miles below, and the inclination is strong to step carefully in fear of dislodging some stone that might crush the tiny hamlet.

The ascent up the canyon is commenced at Junction Meadow at an elevation of 8,000 feet. From there the trail climbs steadily to an elevation of approximately 11,000 and then drops to 10,300 at Crab Tree Meadow. This is the camp from which most trips are made, from the western side, to the summit of Mt. Whitney. Despite the fact that Mt. Whitney is the highest peak in the United States, the ascent is in no way difficult except for those to whom the presence of pure ozone in the lowermost cavities of the lungs is a strange and terrifying experience. There is a stretch of about 500 feet called the Chimney which presents a few passages here and there which at first seem a trifle difficult to negotiate, but they become simple as they are approached. The summit is pervaded with a spirit of aloofness from the lower world which is most impressive and this, together with the view of Lone Pine over two miles below and less

than twelve miles to the east, seems to lift the peak to an altitude that more closely approximates the heavens than many of those who climb had ever hoped to attain. The east shoulder of the mountain is a vertical precipice of 1,500 feet, at the base of which lies a small lake which is partly covered with snow and ice. Desolation and lightning-pierced piles of granite boulders surround the peak on every side, and if the ever-imminent storm does not suggest the advisability of immediate departure, the cold and the sensation of approaching tragedy are bound to do so. Strangely enough the return trip is more difficult than the ascent and sighs of relief are a familiar sound to the stunted pines of Crab Tree Meadow.

The next fifteen miles of the trail that leads to Whitney Meadows is a succession of weird scenery and startling panoramas. The trail passes over the sand flat to the east of Mt. Guyot and around the southern shoulder of the Siberian Outpost to the home of the golden trout.

Scenery, like people, is of interest in proportion to the degree of individuality which it expresses. A rolling hill of nondescript character will no more interest a traveler than will a person with nondescript features and mediocre mind. There is a strange individuality to the scenery in the vicinity of the Siberian Outpost which is all but

intangible. On either side of the trail are fields of dwarf lupins of that pale blue which suggests the watery eye of the "ancient mariner." In the distance not many miles are forests of spectral trees silhouetted against the neutral gray of granite peaks. The entire scene is pregnant with the spirit of mystery and desolation. In sharp contrast to it is the babbling brook that tumbles down over the granite boulders that have resisted the disintegrating forces.

Whitney Meadows are threaded by Golden Trout Creek, which is the home of the famous golden trout and the only place in the world where this particular variety of fly-loving, golden-bellied trout are to be found. The meadow on either side of the creek is free of any growth, save grass, for hundreds of yards, and if your eye is sharp enough and your hand sufficiently skilled, you may cast a fly into the corner of the pool forty or



Photo by Mark Daniels.

THE SUPPLY TRAIN

The cook and the pack mules and horses descending from Franklin Pass on the Great Western Divide at the time the author with a party of friends visited that section.

fifty feet away and see the wily trout jump from the shadow of the bank. It is like fishing in a gold-fish bowl and catching real gold-fish, and if you are possessed of the sportsman instinct, your constant inclination will be to toss the beauties back into the stream.



Photo by Mark Daniels.

ON MT. WHITNEY'S SUMMIT

E. O. McCormick, a vice-president of the Southern Pacific R. R., one of a party which last summer spent some time in the park, standing at the rock monument which marks the top of the highest peak in the United States.

From Whitney Meadows the trail leads over the summit of the Sierra Nevada through Cottonwood Camp, by Horseshoe Meadow and down, down, down to Lone Pine. On every side are snow-clad peaks, mountain streams and verdant forests, until the true eastern slope is reached. On the north shoulder of Wonoga Peak the first view of Owen's Lake and the desert ushers in another phase of nature. From here on, arid desolation is the keynote. Through the haze, the great salt basin of Owen's Lake appears like a mirage a mile and a half below. The barren slopes of the Panamint Range which hide Death Valley from view appear as mammoth mounds outposting the way to the Funeral Range beyond.

At Lone Pine the stage runs to the railroad station which means farewell to this land of dreams. Each halting step on the downward trail spells another tug at the heart strings to return for one more night up near the stars and in the life-giving air intended for the lungs of man whom God made in his own image.

FIGHTING MOTHS WITH PARASITES

OVER 12,000,000 specimens of two parasites which prey on the gipsy moth and brown-tail moth were released in 201 towns in Maine, New Hampshire, Massachusetts and Rhode Island during the fall of 1914 and spring of 1915, according to the annual report of the Bureau of Entomology, United States Department of Agriculture. As a result of the successful establishment of colonies of these and other parasites which feed on the gipsy and brown-tail moths, marked progress is being made in reducing these pests. Effective cooperation is being afforded by the States, which carry on as much work as possible within the infested areas, thus allowing the Federal authorities to carry on field work along the outer border of infestation, so as to retard the gipsy moth's spread.

As a result of scouting work carried on by the entomologists in 223 towns in New England, the gipsy moth was found in 4 towns in Maine, 23 in New Hampshire, 3 in Vermont, 10 in Massachusetts, and 10 in Connecticut, making a total of 50 towns where the insect had not been previously reported. This scouting consists in an examination of all roadsides, residential sections, orchards and woodlands. Where colonies are found the egg clusters are treated with creosote and the trees are banded with three tanglefoot and sprayed with arsenate of lead.

The spread of the brown-tail moth during the past year has been inconsiderable, the indications being that this pest has not infested any territory other than that already reported. In cooperation with the United States Lighthouse Service, the work of collecting moths at night along the coast of Connecticut and Long Island has been continued.

Other activities of the Bureau in relation to the gipsy moth include the inspection of forest products, nursery stock, and stone and quarry products shipped from gipsy-moth territory, as well as extended investigations along other lines.

National Parks as an Asset¹

BY HON. FRANKLIN K. LANE, *Secretary of the Interior.*

THE United States furnishes playgrounds to the people of this country which are, we may modestly state, without any rivals in the world. Just as the cities are seeing the wisdom and the necessity of open spaces for the children, so, with a very large view, the nation has been saving from its domain the rarest places of grandeur and beauty for the enjoyment of the world.

And this fact has been discovered by many only this year. Having an incentive in the expositions on the Pacific coast, and Europe being closed, thousands have for the first time crossed the continent and seen one or more of the national parks. That such mountains and glaciers, lakes and canyons, forests and waterfalls were to be found in this country was a revelation to many, who had heard but had not believed. It would appear from the experience of this year that the real awakening as to the value of these parks has at last been realized, and that those who have hitherto found themselves enticed by the beauty of the Alps and the Rhine and the soft loveliness of the valleys of France, may find equal if not more stimulating satisfaction in the mountains, rivers, and valleys which this Government has set apart for them and for all others.

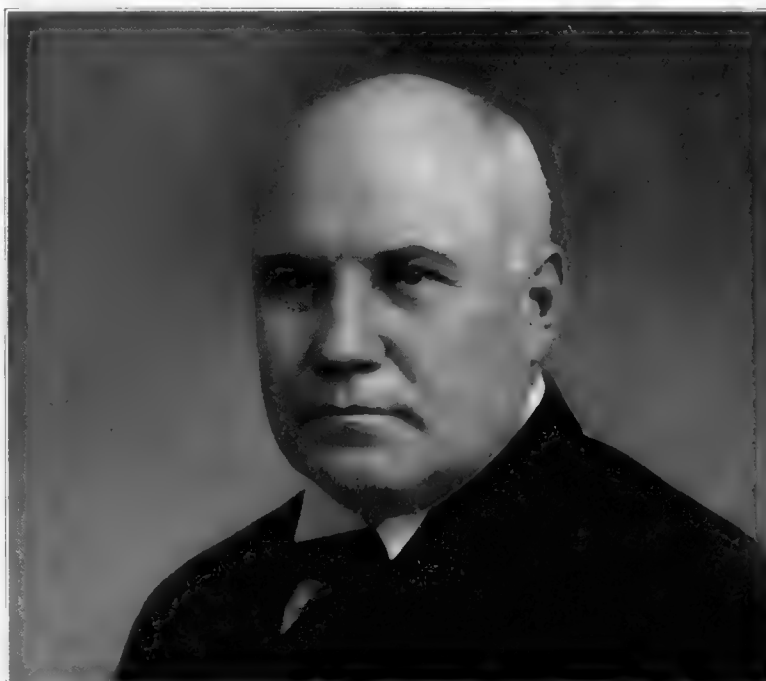
It may reconcile those who think that money expended upon such luxuries is wasted—if any such there are—to be told that the sober-minded traffic men of the railroads estimate that this year more than a hundred million dollars usually spent in European travel was divided among the railroads, hotels, and their supporting enterprises in this country.

During the year a new national park of distinction and unusual accessibility has come into existence. It crosses the Rockies in Colorado at a point of supreme magnificence; hence its title, the Rocky Mountain

National Park. Through it, from north to south, winds the Continental Divide—the Snowy Range in name and fact. Two hundred lakes grace this rocky paradise, and bear and bighorn inhabit its fastnesses. It has an area of 350 square miles and lies only 70 miles from Denver. Many hotels lie at the feet of these mountains and three railroads skirt their sides.

This is Colorado's second national park, the other being Mesa Verde, where this department, with the assistance of Dr. Jesse Walter Fewkes, of the Smithsonian Institution, has uncovered during the last summer prehistoric ruins of unprecedented scientific interest.

Oregon has but recently completed a great highway along the Columbia River. This should be connected by road with Mount Hood and a portion of the present forest reserve converted into a park. The limits of Sequoia Park, in California, the home of the great redwoods, should be so extended as to include the Kern River Canyon, a most practicable project today; but tomorrow may be too late, because of the lumber interests. The Grand Canyon is not yet part of the park system, al-

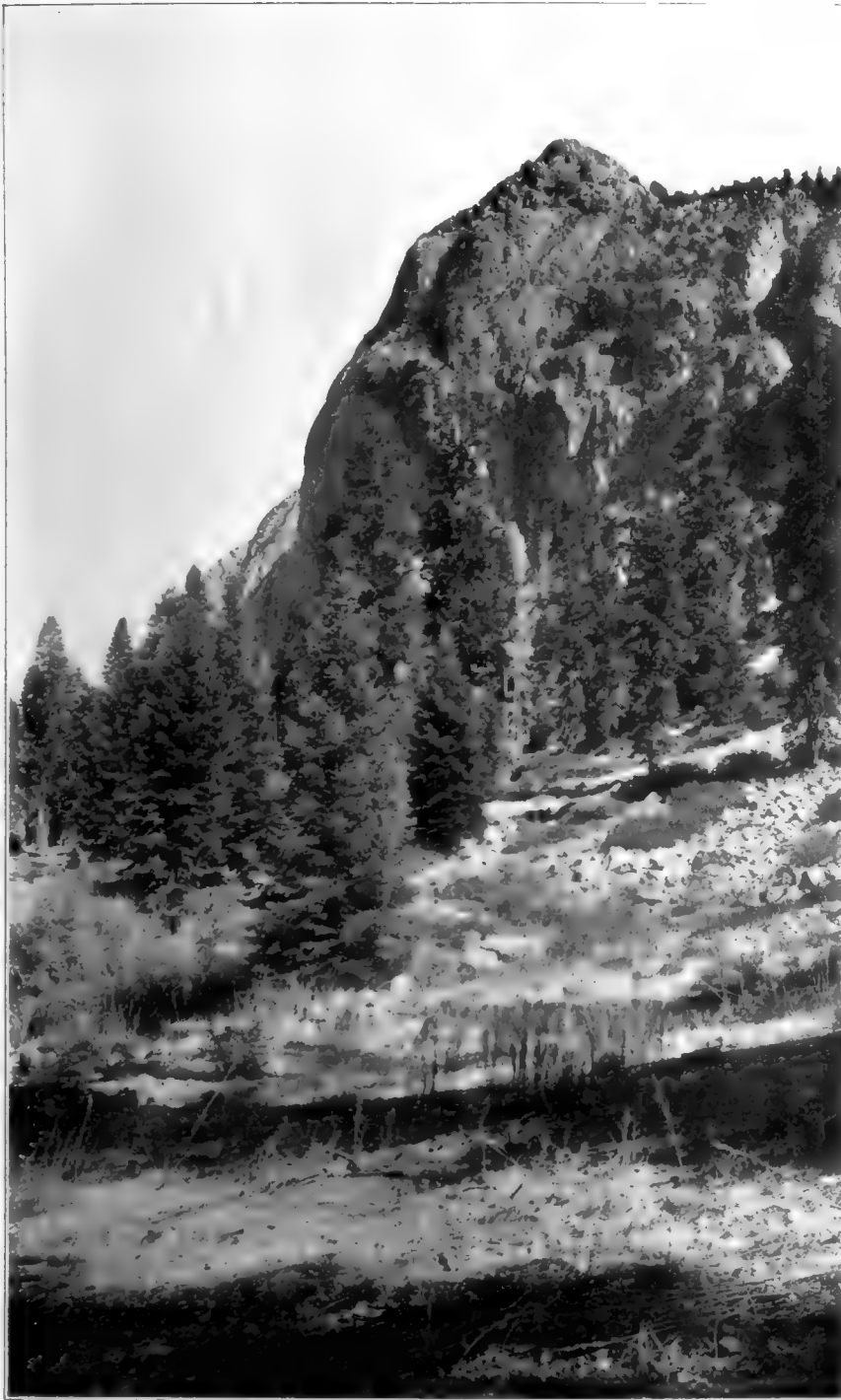


HON. FRANKLIN K. LANE
Secretary of the Interior.

though as part of a national forest it comes under the control of the Department of Agriculture.

There is no reason why this nation should not make its public health and scenic domain as available to all its citizens as Switzerland and Italy make theirs. The aim is to open them thoroughly by road and trail and give access and accommodation to every degree of income. In this belief an effort has been made this year as never before to outfit the parks with new hotels which should make the visitor desire to linger rather than hasten on his journey. One hotel was built on Lake McDermott, in Glacier Park, one is to be built immediately on the shoulder of Mount Ranier, in Paradise Valley, another in the valley of the Yosemite, with an annex high over-

¹From Secretary Lane's annual report to Congress.



WHITNEY DOME

The dome formation of the southern Sierra does not take the perfect form found in the Yosemite region. This dome is on the rim of the King River Canyon, California.

head on Glacier Point, while more modest chalets are to be dotted about in the obscurer spots to make accessible the rarer beauties of the inner Yosemite. For with the new Tioga road, which, through the generosity of Mr. Stephen T. Mather and a few others, the Government has acquired, there is to be revealed a new Yosemite, which only John Muir and others of similar bent have seen. This is a Yosemite far different from the quiet incomparable valley. It is a land of forests, snow, and glaciers. From Mount Lyell one looks, as from an island, upon a tumbled sea of snowy peaks. Its lakes many of which have never been fished, are alive with

trout. And through it foams the Tuolumne River which in a mile drops a mile, a water spectacle destined to world celebrity. Meeting obstructions in its slanting rush, the water now and then rises nearly perpendicularly, forming upright foaming arcs sometimes 50 feet in height. These "water wheels," a dozen or more in number, will be accessible next summer by a trail to be built when the snow melts in June.

While as the years have passed we have been modestly developing the superb scenic possibilities of the Yellowstone, nature has made of it the largest and most populous game preserve in the Western Hemisphere. Its great size, altitude, its vast wilderness, its plentiful waters, its favorable conformation of rugged mountain and sheltered valley, and the nearly perfect protection afforded by the policy and the scientific care of the Government have made this park, since its inauguration in 1872, the natural and inevitable center of game conservation for this nation. There is something of significance in this. It is the destiny of the national parks, if wisely controlled, to become the public laboratories of nature study for the nation. And from them specimens may be distributed to the city and State preserves, as is now being done with the elk of the Yellowstone which are too abundant, and may be later with the antelope.

If Congress will but make the funds available for the construction of roads over which automobiles may travel with safety (for all the parks are now open to motors) and for trails to hunt out the hidden places of beauty and dignity, we may expect that year by year these parks will become a more precious possession of the people, holding them to the further discovery of America and making them still prouder of its resources, esthetic as well as material.

WOOD PRESERVERS' CONVENTION

THE Twelfth Annual Convention of the American Wood Preservers' Association will be held at Hotel Sherman, Chicago, January 18, 19 and 20, 1916. Delegates from the United States and Canada will attend and it is expected many outsiders will be drawn to the Convention by reason of their interest in the conservation of our forest resources and the economic utilization of wood.

The Forests of Alaska

BY HENRY S. GRAVES

Chief Forester, U. S. Forest Service

THE American people are only just coming to realize that large portions of Alaska are habitable and that, through the development of the valuable resources, there will be an extensive permanent population, destined to make the territory an important part of our nation. The average visitor today goes as far north as Skagway. He sees only a small corner of Alaska, though it is a part abounding in interest and rich in opportunities for development. Perhaps most visitors are interested chiefly in the unmatched scenery, the rugged mountains of the mainland and of the larger islands, the narrow, sinuous passages between the islands and in the deep inlets, the snowfields, glaciers, and waterfalls, and the Indian villages with their emblematic and

mortuary totem poles. The tourist is able to get a glimpse of a few of the larger mines, and visits some of the numerous canneries and fish-salting establishments. But a real appreciation of the actual conditions and the problems of development can be obtained only by taking time to go about among the various islands of the Archipelago, stopping off at different points to see the resources themselves and the beginnings that are being made for their development—the logging operations, the mines, the quarries, the settlers' homesteads, and the fishing enterprises.

Such a visit reveals the fact that one of the most important of the resources of southeastern Alaska is the timber. The high range of the mainland and the back-



WESTERN RED CEDAR IN ALASKA

The forests on the southern coast of Alaska represent an extension of the coast belt of Oregon, Washington, and British Columbia. There are many of the same species, with trees of large size and heavy yield, and there are similar characteristics of forest life. In southeastern Alaska the western red cedar grows in abundance, mingling with the spruce, hemlock, and the Alaska yellow cedar.



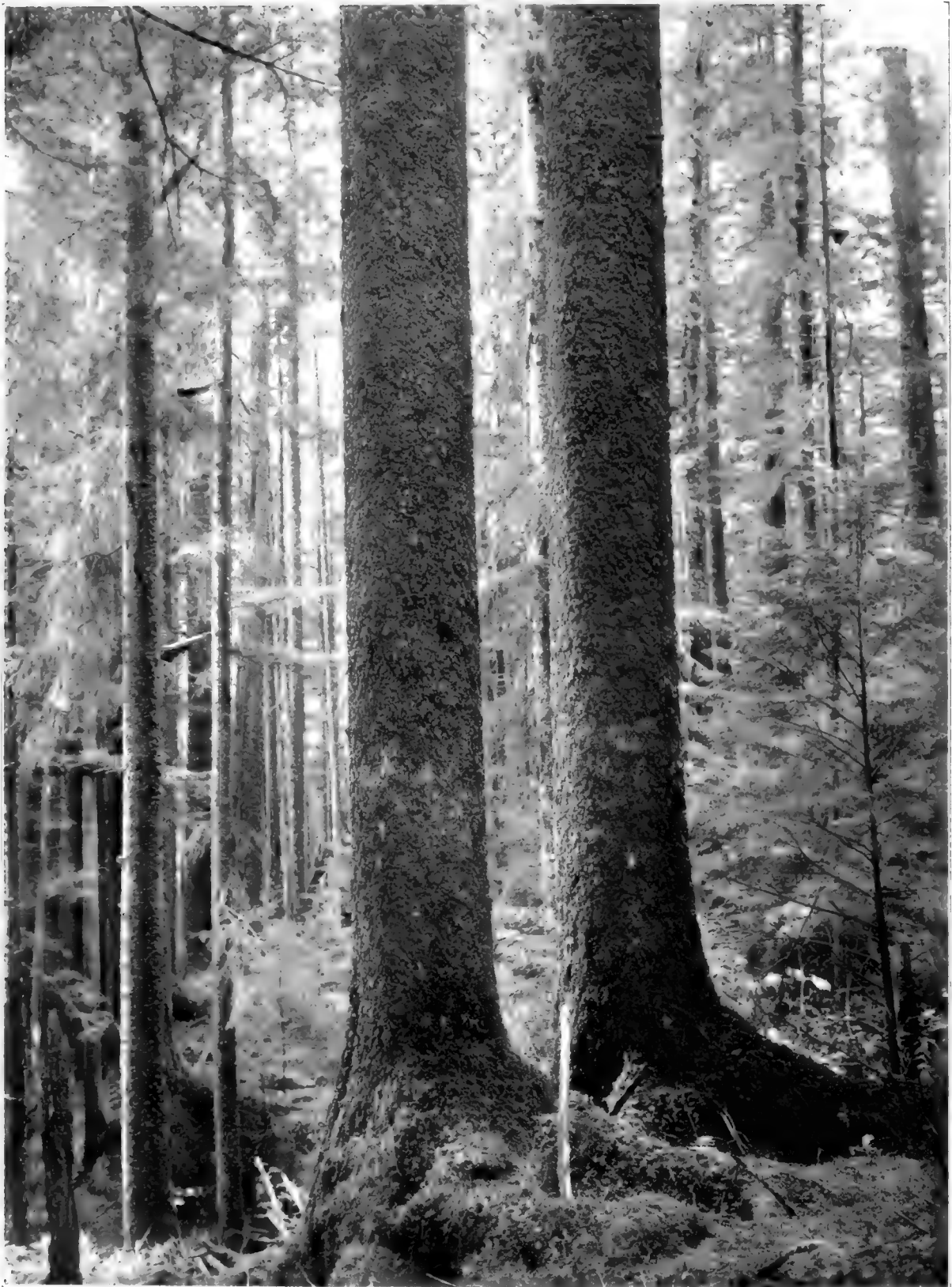
HEAVY TIMBER IN THE TONGASS NATIONAL FOREST

The heaviest stands of timber in the Tongass National Forest occur on the flats, benches, and protected slopes. The trees reach, however, an astonishingly good development on beds of boulders and stones where the soil is meager. On the better and deeper soils, the Sitka spruce often occurs to the exclusion of other species and in such locations very largely predominates in the stand. Chief Forester Graves in the foreground.

bone of the larger islands rise above timberline, but many of the islands and peninsulas of the mainland have a relatively low elevation and are wooded to the top. But the forests, as viewed from the water, give little idea of their real character. Seen from a distance, they may appear unimpressive. If, however, one goes back into the woods, landing, for example, at the head of one of the innumerable bays, he finds himself in a great timber forest, with the characteristics and many of the same species found in the forests of the coast of Washington. It is in reality in the same forest region as western Washington and British Columbia, for southeastern Alaska, under the influence of favorable ocean currents, is characterized by a very equable climate, a relatively long growing season, and a large amount of moisture. These are the same climatic conditions that create the great forests of the northwest coast of the States. There is on the coast of Alaska, as farther south, the same response of vegetation to climate and a forest composed

of trees of large size and heavy yield, and having the same general form, character of reproduction and of life development.

We may speak of the northern coast forests of the States as representing the center of best development of the prevailing forest type, and the Alaskan coast forests as its northern extension. As one moves from the center or optimum region of development of a forest type, the number of species drops off and the trees do not reach as great a size and yield. This is true of Alaska. One conspicuous species of the Washington and Oregon coast is absent, the Douglas fir, as well as a number of the less important species. The forest is made up chiefly of Sitka spruce, western hemlock, and red and yellow cedar, with a number of other species so scattered or so inferior as to be of no economic importance. The trees are also smaller, for in Alaska the spruce reaches a maximum diameter of about 8 feet and a height of over 200 feet, while in the States one finds spruce more than 12



SITKA SPRUCE IN THE TONGASS NATIONAL FOREST

The most important species in Alaska is the Sitka spruce. Single trees reach a diameter of over seven feet and a height of 200 feet. A single log brought to one of the local mills was 154 feet long and scaled 18,000 board feet. Many parts of the forest run from fifty to seventy-five thousand feet per acre, limited areas carry one hundred thousand feet per acre.

feet in diameter. But this comparison indicates an extraordinary development of the Washington forests rather than a small yield in Alaska.

The coast belt extends from Dixon's entrance west to Kemi Peninsula, a distance of about 1,000 miles, inter-

rupted at several points where the mountains extending to the sea are so rugged and rocky or have such a cover of ice and snow that tree vegetation is prohibited. Just as the Alaskan coast forests have a smaller development than the coast forests further south in the States, so the

northwestern portion of the belt within Alaska has a smaller development than the southeastern extremity. The bulk of the timbered area of the south coast of Alaska is included in two National Forests, the Tongass Forest, comprising the principal timber areas southeast of Cape St. Elias, while the balance is incorporated in the Chugach Forest.

The fact that there are only two National Forests in Alaska and these confined to the south coast has given

tonwoods, and is an extension westward of the north Canadian forest.

THE TONGASS FOREST

The Tongass National Forest, comprising an area of about fifteen million acres, contains one of the most extensive bodies of timber remaining in the United States. Its great extent, its enormous volume of useful products, and its accessibility give to this Forest far



AN INDIAN LOGGING CAMP ON THE TONGASS NATIONAL FOREST

The National Forest timber sales furnish labor to native tribes and will be an increasing factor in forwarding the prosperity of the Indians. Formerly the cutting of timber was confined for the most part to material near the shore which could be "hand-logged," that is, cut and put into the water wholly by hand labor. Modern logging appliances are now being introduced and the work in the lumber woods becoming more highly organized.

rise to a popular impression that there is little or no timber elsewhere in the Territory. It is true that the heaviest timber is within the area already described. But it is also a fact that a large part of interior Alaska was originally covered with a natural forest growth. Taking the Territory as a whole, about 40 per cent of the total area was originally wooded; and that is almost as great a percentage as the original forest area of the States. The forests of the interior of Alaska are, however, of a totally different type from those on the south coast—different species, smaller trees, smaller yield; a forest which will not play much, if any, part in the supply of the general lumber markets of the country, but which is of enormous importance for building up and maintaining local industries and domestic needs. It is a forest chiefly composed of white spruce, white birch, and cot-

more than local importance. It will be a great factor in the industrial upbuilding of Alaska. As a reservoir of forest supplies it has an importance that makes its problems of national interest.

The favorable climatic conditions have produced a forest of large yield of valuable timber. Not uncommonly individual spruce trees contain over 15,000 feet of lumber. During the last year a single log was brought into a mill in Ketchikan that scaled 18,000 feet. It was 154 feet long and 41 inches in diameter at the top end. Many stands yield 50,000 board feet per acre, and restricted areas run as high as 100,000 feet per acre. There are now on the Tongass Forest fully eight to ten million acres carrying merchantable timber which will average, over the entire area, not less than 7,000 to 9,000 feet at a conservative estimate. This does not

include several million acres scattered throughout the Forest whose timber cannot at the present time be considered of merchantable character. A total of from 60 to 70 billion feet of timber of useful sizes and quality is a conservative estimate.

The timber constitutes one of the greatest natural resources of southeast Alaska. There is not only an abundant supply for local use, but there are exceptional opportunities for the development of wood using industries for export from Alaska. The timber is of good quality and of heavy yield, and it is very accessible, easily logged, and close to water transportation. On the Tongass National Forest there are over 12,000 miles of shore line. The timber is close to the water and can be easily logged, with a small amount of investment required for improvements. There are many undeveloped water powers close at hand and available for use in running a sawmill or pulp mill. Under right handling, that provides for the perpetuation of the forest, not less than five or six hundred million feet could be taken each year from the Tongass Forest without reducing the total stock, as the new growth would equal the amount cut.

The heavy rainfall which occurs on the greater portion of the Tongass National Forest prevents, during normal seasons, serious danger from fire. This heavy rainfall, however, occurs chiefly on the islands; it falls off on the deep indentations and inlets and up the rivers of the

main land. Conspicuous examples of this are the Stikine River and Lynn Canal. In these sections forest fires have already done a large amount of damage, and seasons of great hazard are frequent. Dry seasons, however, also occur on the other portions of the Tongass National Forest, and there are many places which show damage from former forest fires. The season of 1915 was one of the driest known for many years. The drought was so great as to embarrass many communities and industrial plants, whose sources of water was dried up or greatly reduced. The ground cover became dry and inflammable, not only in openings and on cut-over lands, but in a great many places in the deep forest, where ordinarily there is enough moisture in the moss and humus to prevent fires from running. Extensive areas in the Tongass National Forest were during the past season in an inflammable condition.

THE CHUGACH FOREST

The coast forests to the westward of Cape St. Elias are comprised in the Chugach National Forest. There are included the timbered areas on a strip of irregular and deeply indented coast line skirting the Chugach mountain range and its southern spurs, the islands in Prince William Sound, Afognak Island, and a portion of Kenai Peninsula. The Chugach Forest comprises a total land area of 5,368,044 acres.



A TYPICAL LAKE VIEW ON THE TONGASS NATIONAL FOREST

One of the characteristics of the Tongass National Forest is that a great deal of the timber is very accessible, close to water transportation, and easily logged. There are many undeveloped water powers close at hand and available for use in operating a sawmill or a pulp mill.



A TYPICAL STAND OF BIRCH IN THE INTERIOR OF ALASKA

The timber in the interior of Alaska is not large and consequently will not be of importance from the standpoint of the general lumber industry. These forests are, however, of great value locally, for the presence of readily available timber is indispensable for the settler, for the miner, for road building and other pioneer work of development. It is of great importance for the Government to put a stop to the present great destruction of these forests by fire.

The region falls within the same general climatic zone as southeast Alaska. A heavy and well-distributed rainfall and a fairly long growing season cause a forest of excellent yield wherever the soil is suitable. The Chugach Forest unit extends, however, at its northwestern limit into the dry zone and includes a large area of timber of the interior type. Approximately 80 per cent of the whole area is of the coast type, the remaining 20 per cent of the interior type.

The conditions for forest growth are somewhat less favorable than in southeast Alaska. The chief cause of the difference is the more rugged topography. A larger proportion of the area is on the mainland, and the islands are bolder and have a more rugged topography than the average on the Tongass. In consequence, the forest often forms a strip along the coast of not over a half mile to two miles in depth. Again the forest is at a higher latitude which, combined with the local effect of the numerous ice fields and glaciers, gives somewhat less favorable conditions of growth.

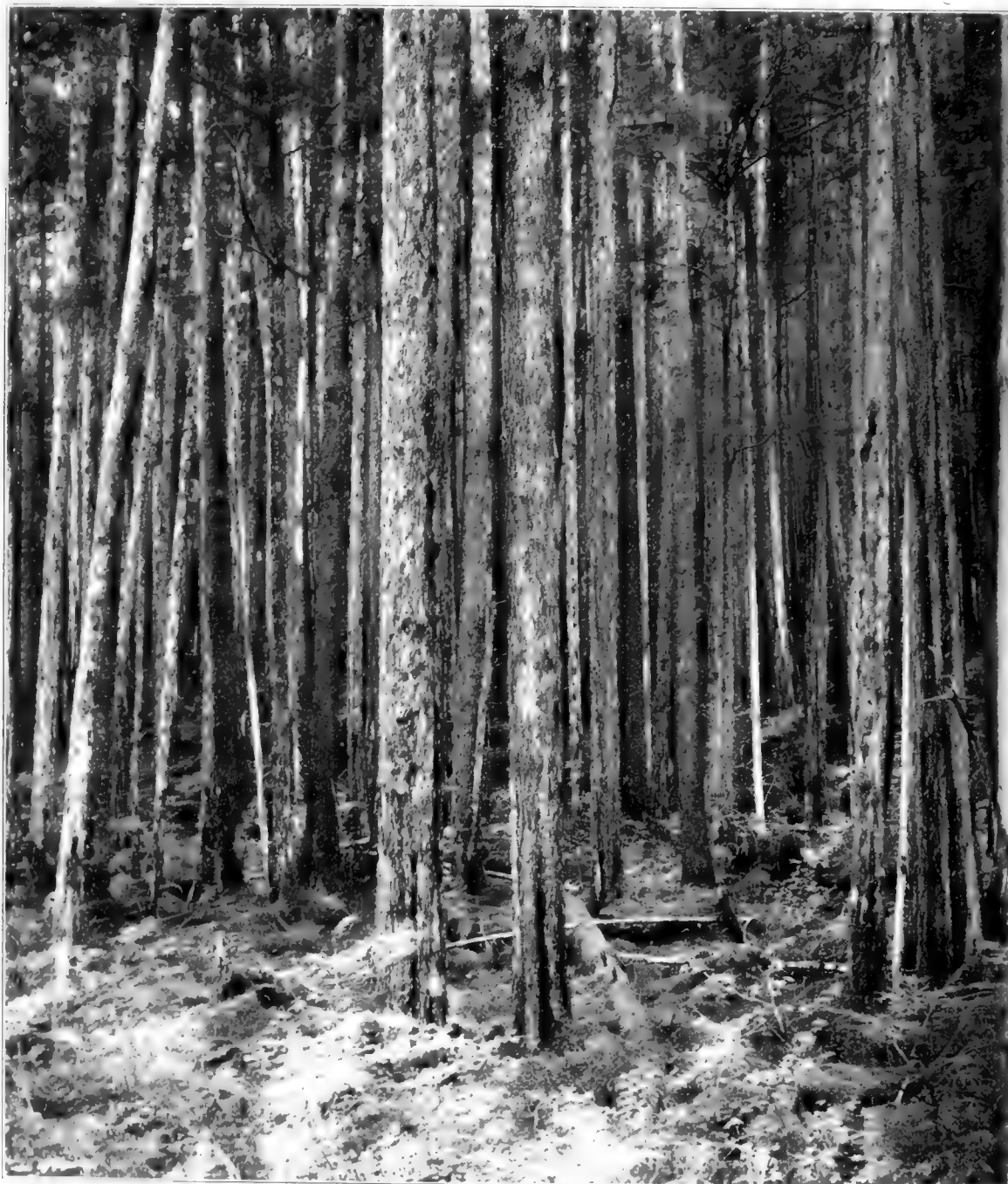
The coast type of forest on the Chugach is composed almost wholly of Sitka spruce and hemlock. A little yellow cedar has been found, but it is very localized and not in sufficient quantities to be of any economic importance. Cottonwood also occurs in the coast type, but it is of but little commercial importance. Spruce on the Chugach Forest reaches a height of over 125 feet and a diameter of 6 feet. The average run of merchantable spruce is from two to three feet in diameter and 80 to 110 feet in height. The hemlock averages less in size than the spruce. In one sale on Montague Island there were cut two million feet on 100 acres, in addition to 35,000 linear feet of piling and a large quantity of material used for cordwood. I have examined a number of stands, selected at random, which carried 20 to 25 thousand feet of lumber, with individual spruce trees averaging from 1200 to 2500 board-feet each.

The hemlock on the Chugach is in general less sound than that on the Tongass. Not uncommonly hemlock growing on unfavorable soil is very unsound, the major-

ity of trees showing defect. Here and there are found areas of very poor drainage where peat has accumulated and a muskeg is formed on which the trees are scattered or absent entirely, and such timber as occurs is short and scrubby. On the other hand, there is an immense amount of excellent hemlock, sound and of high usefulness for structural material.

The external appearance of the coast forests of the Chugach is very deceptive. Occurring in many places as a relatively narrow belt, backed by high rugged mountains, the forests are overshadowed by the more conspicuous bare ridges, peaks and snow fields above timber line. The actual area of timber is under such circumstances not appreciated by the casual observer. The

trees on the edge of any forest have long crowns and are shorter than those within the stand. The scrubby, unsound hemlock on the rocky points and along the shore at the edge of the forest, the scattered dead trees that stand out conspicuously as seen against a slope, the existence of certain areas with pure hemlock and that having a large degree of defect, and the scattered areas of muskeg give an impression of an unhealthy condition that is misleading. No one, even an expert, can judge the character, condition and yield of a forest by looking at the mass of crowns from a distance. I have personally examined numerous stands which had precisely the aspect I have described, and found within the stand excellent spruce and a large amount of sound hemlock.



SECOND-GROWTH STAND OF SITKA SPRUCE AND HEMLOCK

Sitka spruce reproduces itself readily and grows rapidly. Many old windfalls have come up to a dense growth of spruce and hemlock. The forest shown in this view will soon yield piling. The trees have already reached a size specially adapted for the manufacture of wood pulp.

At the west end of the Chugach Forest there is a marked change in the climatic conditions. Whereas the rainfall on the Prince William Sound is from 75 to over 100 inches, it is less than 30 inches at the northwestern edge of the Forest. The high mountain ranges separate the Forest into two climatic regions, and there are correspondingly two distinct forest regions. The forest on the west end of the Chugach is of the interior type. This portion of the Forest is subjected to a great hazard from fire. During the past season the Forest officers were kept busy for nearly three months fighting fire. It was only through the work of these men that a large body of the best timber in that section was saved.

At the present time the largest single demand on the Forest is for piling and ties for the Government railroad. A permit has already been issued by the Forest Service to the Alaska Engineering Commission for 85 million feet for piling, ties and other purposes, on areas readily accessible to the railroad right of way. Aside from this special requirement for timber, there are used locally every year considerable amounts of timber for lumber, for piling in construction and maintenance of docks at towns, mines, and canneries, for mine timbers, and for various other miscellaneous uses.

Many persons have undertaken to depreciate the value and usefulness of the Chugach timber. It has recently



A RECENTLY BURNED FOREST IN THE INTERIOR OF ALASKA

The interior forests of Alaska are composed chiefly of white spruce, white birch and cottonwood. This view shows a typical spruce stand. On account of the relatively low rainfall these forests are subject to great fire hazard. There is no system of protection, and the aggregate destruction by fire during the past fifteen or twenty years has been enormous. The past season was an unusually dry one, and it is estimated that several million acres at least of these forests were burned over.

The total volume of timber on the Chugach National Forest is estimated as approximately 6 to 8 billion feet. This includes the timber of merchantable size and character, which is suitable for lumber, piling, ties, and pulp material. It excludes the unsound, straggling trees whose use for any purpose is doubtful.

The Chugach Forest is important, first as a source of forest products to meet local needs in the development of the region in which the Forest is located. It will have an increasing importance in furnishing certain classes of construction material in other parts of Alaska, and it is quite probable that there will be a demand later on for pulp material.

been argued that the shipping of lumber from Seattle and Tacoma to Valdez and other points within and near the Chugach Forest is conclusive proof that the local timber is of no public importance, is of little or no commercial value, and that the public control over it should at once be abandoned and the land opened to private acquisition.

The shipping into Alaska of lumber products from the outside does not prove in the slightest degree that the Alaskan timber is unfit to meet the requirements of local use, either in quality or amount. It indicates that the present economic conditions have not yet justified the development of a manufacturing industry that can com-



DESTRUCTION BY FIRE IN THE TONGASS NATIONAL FOREST

Portions of the Tongass National Forest have such a good distribution of rainfall during the summer that in ordinary seasons there is relatively little danger from fire. Those portions of the forest, however, on the coast, particularly at the head of the long inlets, have a much smaller rainfall and are exposed to a serious fire hazard. Occasionally, as during the past season, other portions of the forest become dry and over extensive areas are inflammable, requiring effective patrol to prevent serious damage.

pete with the outside material. At the present time also there is a great depression in fir on the coast, due to overstocking the market, and lumber is being sold at very low prices. Labor costs are much higher in Alaska than in the States, an item that in many cases enables coast mills under present conditions to compete in the north. But very important also is the fact that the lumber industry has not yet been developed in the west Alaskan forests on a scale to enable competition with the great mills to the south. The increased demands for forest products will bring a development of manufacturing plants to supply it; the adjustment of economic conditions in Alaska will bring the cost of labor nearer to that in the States. The recovery of the lumber markets of the States will prohibit selling prime lumber at sacrifice prices. Transportation facilities will be developed so that lumber can be shipped short distances at reasonable rates. Then the local forest material that is equally suitable with outside lumber for the industrial needs of the region will be used instead of imported material. This process will take place both on the Tongass and on the Chugach Forest, for the resources are of sufficient quantity and of the required quality.

FORESTS OF THE INTERIOR

The interior of Alaska has climatic conditions very different from the southern coast, and a correspondingly very different character of forest growth. A short growing season of great intensity, a light rainfall, and a cold soil are factors that restrict the species to a few of the hardiest kinds, and produce a forest of slow growth and light yield. The dominant species are white spruce, white

birch and cottonwood. The spruce grows heaviest on the flat lands, where it is often in pure stands over considerable areas or is mixed with cottonwood or birch. On the hill slopes the birch predominates, and frequently forms pure stands. In the swamps the white spruce is often replaced by black spruce, growing alone or with willows, and in places having a mixture of tamarack. Aspen and willows constitute a minor growth, coming upon newly formed river bars or on burned areas.

The largest and most valuable tree is the white spruce. Its average size is from 6 to 10 inches, its maximum seldom over 18 inches in diameter. Sometimes the spruce reaches a height of 90 to 100 feet, more often it is from 50 to 70 feet high. Cottonwood reaches similar dimensions, but birch is smaller by some 20 to 30 per cent. As is evident from the size of the oldest trees, the growth is exceedingly slow, due to the cold soil and short growing season. The timber is often knotty and the lumber, as compared to that produced in the States, is of inferior quality.

The forests are one of the most vital factors in the development of the interior of Alaska. They are absolutely necessary in the establishment and building up of the chief industries, mining and agriculture, essential in the construction and maintenance of pioneer roads and trails, and their presence is an indispensable element in making the country habitable.

The value of the interior forests should not be gauged by the size and quality of the trees for lumber, or their place for possible use in the general lumber markets of the Pacific coast. They have rather an economic value as a local necessity that can be measured by contrasting the development that will take place with their aid, with

the conditions that would exist without them and will exist if they are destroyed. Nor can the economic position of the forests be judged by their aggregate extent and total volume of wood and timber. In a country of vast distances, sparse population, high cost of labor, and

roots killed, and soon topple over. The past season was an unusually dry one in Alaska and an exceptionally large area of forest was destroyed. How extensive this area aggregates cannot be estimated with any degree of accuracy, but without question several million acres were burned over. It is imperative that immediate steps be taken by the Government to stop this unnecessary damage.

PUBLIC OWNERSHIP PROMOTES DEVELOPMENT

The continuance of the National Forests and their efficient administration will have a very large influence on the development of the region in which they are located and on that of the whole Territory as well. They were established to ensure the protection, right utilization and perpetuation of the timber resources. Just as all National Forests, they contain resources other than timber for whose development provision must be



AN ALASKAN FISH CANNERY

The fisheries constitute one of the most important industries in Alaska. On the two National Forests there are seventy-five canneries, salteries and other fishing stations. These establishments use large quantities of material furnished from the National Forests, lumber for packing boxes, piling for docks and traps, material for docks, plank walks, etc.

meagre facilities for transportation, it is the presence of forest supplies immediately at hand that may make the development of industry and the establishment of homes in a given locality possible.

The interior forests of Alaska are being destroyed at an appalling rate by forest fires. Conditions existing in the western United States 25 years ago are repeating themselves in Alaska. The entrance of the white man brought the forest fire, and he has succeeded in a short period of less than 20 years in destroying the forests to an average extent of fully a million acres a year.

The summer season, though short, is hot and dry, and except where a great deal of moisture is in the soil and moss, the forest will burn. Especially on the slopes and benches the ground cover dries out sufficiently to carry fire. The fire usually does not burn rapidly but eats its way over the ground, burning up the vegetable duff and moss and any slash and snags that may lie in its path. The flat-rooted trees that depend largely on the vegetable deposit on the surface of the ground have their



A TYPICAL VIEW AMONG THE ISLANDS OF THE TONGASS NATIONAL FOREST

The Tongass National Forest in southeast Alaska comprises most of the wooded islands of the Alexander Archipelago. Many of the islands are characterized by relatively low elevations, though some of the larger islands, such as Baranof, Admiralty, Chichagof, and Prince of Wales, have high, rugged mountains rising in places above timber line. The Tongass National Forest, with a land area of approximately 15 million acres, has a shore line of over 12,000 miles.

made. The administration of these areas involves not merely the management of the timber. The Forests should be made to serve in the building up of the country, the establishment of industries, and the creation of opportunities for a permanent population.

One of the advantages of public ownership is that

every user has an opportunity to obtain timber to meet his needs, personal or for commercial use, in such quantities as he requires and at reasonable terms. The settler secures the material required for his personal use free and without the need of a permit. The miner may use the timber for mining development that stands on his claim, and he can draw on the National Forest supplies if need be without the necessity of purchasing from private owners at such a toll as the latter might choose to levy; and he knows that if he develops a mine requiring large amounts he will not later be embarrassed in obtaining the material without which he cannot proceed. The fishing industry is using large quantities of piling for fish traps and docks, and this is obtained promptly, under a simple procedure, and at reasonable cost.



AN ALASKAN SAWMILL

There are upon the two National Forests over thirty sawmills. It is the policy of the Forest Service to encourage the development of the lumber industry. Approximately 40 million feet of timber are cut annually in the National Forests under sales, in addition to material secured by settlers for personal use. The largest single timber sale has been for thirty-three million feet.



LOADING LUMBER FOR EXPORT

Already a certain amount of timber has been exported from the Tongass National Forest in Alaska to the United States. A number of important shipments were made in 1913. The demand then fell off on account of the depression in the lumber market. Recently there have been shipped as much as 10 million feet of special spruce lumber for use in the construction of aeroplanes. The Sitka spruce is regarded by manufacturers of aeroplanes as specially suited to this purpose.

Material is in the same way being furnished from the Forests for wharves, bridges, and other structures required by public and private agencies.

There are upon the two Forests over 30 sawmills

which furnish the bulk of the lumber products used in the region. It is the policy of the Department to encourage the development of the industry, not only for small mills producing lumber for local community use but for larger establishments for distribution to meet the demands of cities, and of the large mines, and for export. The largest single timber sale so far made has been for 33 million feet. A number of large sales have, however, been under negotiation. Two different bodies of 600 million and 300 million feet respectively have been offered for sale, for the establishment of a wood pulp industry. The financial situation has prevented the consummation of these large sales, but it is confidently expected that in a short time the sale of timber will result in the development of industries manufacturing lumber and wood pulp on an extensive scale. The Chugach Forest is furnishing ties and poles for the construction of the Government railroad.

Were there a developed lumber industry, with adequate facilities for local transportation, much of the sawn material also could have been obtained from the National Forests.

It is the policy and practice to encourage agricultural settlement in the two Forests wherever suitable farm lands exist. The new railroad has caused a stimulus to agricultural settlement on areas in reasonable reach of it. More than one hundred settlers will be provided for on the Chugach Forest during the current year. On the Tongass Forest settlement is not taking place so rapidly but the number of new homesteads established is increasing each year. A factor of encouragement to the settler in the Forests is that where the land is unsurveyed, the final survey on the National Forest preliminary to issuance of patent is made by the Forest Service without cost to the settler, while on the public domain the settler has to pay the cost. This advantage is greatly appreciated by the forest homesteaders.

MINING AND WATER POWER DEVELOPMENT

The National Forests are open to prospecting and to the location of mines, just as is the public domain. The examination of the mining claim before issuance of patent is made by mineral examiners, usually by the mineral examiner of the General Land Office, who also examines claims on the public domain. The existence of the Forest in no way interferes with the acquisition of a mine if the mining laws are complied with. The Forest Service endeavors to aid mining through meeting the needs for timber, granting the use of land for power development, and, as fast as funds are available, through constructing trails and roads to open up heretofore inaccessible areas.

At present the chief demand for water power is in connection with mining. These demands are being met and permits are issued for the use of Government lands for power development. Water power is abundant in Alaska and there are many opportunities in the two National Forests for the use of water power for industrial purposes. Mention has already been made of the



A TYPICAL HEMLOCK STAND IN THE CHUGACH NATIONAL FOREST

The Chugach National Forest comprises over five million acres, covering the bulk of the coast forests centering about Prince William Sound and including also a portion of the interior type of forest on Cook Inlet. The principal species in the coast type are Sitka spruce and hemlock. While the timber is not as heavy as in the Tongass National Forest, there is nevertheless a large yield which will be of great importance in the development of that portion of Alaska. The spruce and hemlock forest frequently runs over 50,000 feet to the acre, and very large areas carry from between twenty to thirty thousand feet, with individual trees averaging from 1,000 to 2,500 board feet per tree. Individual specimens of spruce occur with a diameter of six feet and a height of one hundred and fifty feet.

possible use of power in connection with grinding wood for pulp. One large power site is now being considered by American interests with a view to possible use in manufacturing nitrates. Even under the present authority, therefore, water power is being developed; but such development would be hastened if it were possible to grant permits for 50-year periods, irrevocable except for breach of conditions set forth in the permits.

The Forest Service in cooperation with the Geological Survey has established measuring gauges on various streams in order to secure data regarding the flow, and thus determine more definitely the power possibilities where industries may be started.

SPECIAL USES FOR LAND

In the development of the two National Forests there is a great variety of special uses of land that do not fall under the head of agriculture, mining, timber development, or water power. Among the most important in southern Alaska is the use of sites for canneries, salteries, and other stations required in connection with the fishing industries. There are on the two National Forests over 75 canneries and similar establishments handling fish products, that are occupying land under permit or lease.

The law gives authority to lease up to 5 acres of land for purposes of this kind for periods of not to exceed 30 years. A larger area may be used, however, under a form of terminable permit. Ample space is thus provided the fishery establishments and there has been no difficulty in meeting their practical needs.

The special uses of National Forest land have thus been encouraged in every way possible. In many instances, however, considerable money is invested in manufacturing plants, stores, and other buildings and improvements, and the investors would prefer to be able to secure title to the land rather than to have a lease or

permit. My visit to the Forests last summer convinced me that there should be provision for the acquirement of title to such sites under reasonable conditions. The recommendation has been made at various times that the trades and manufactures act be extended to the Forests. I would not advocate the extension of that act exactly as it stands, but I believe that there should be authority for the Secretary of Agriculture to sell sites useful for trades, manufacturing, and special uses, after examination and appraisal of them, but only such sites as are not chiefly suitable for timber, water power, and medicinal springs, or are not needed for public purposes and general public uses.

ADMINISTRATION

The National Forests of Alaska pay their way. During the past five years the receipts from sales of timber and other sources have aggregated \$242,369.30; the expenditures have amounted to \$207,599.86. There has thus been a surplus during that period of \$34,769.44.

The administration of the Alaskan Forests is decentralized to a high degree. Very large authority is delegated to the local officers in order to avoid delays in transacting business which are incident to a centralized handling of the work in Washington. Aside from matters pertaining to alienation of Government land, more than 98 per cent of the Forest business is handled by the local force, only the largest timber sales, water power permits, and questions of policy being referred to the Washington office.

EFFORTS TO ABOLISH THE ALASKAN FORESTS

The Alaskan Forests have been a storm center of public controversy for a number of years. The coal land controversy of 1910 was started because attention was called to an attempt illegally to secure title to certain coal claims, some of which were on the Chugach Forest. The existence of the National Forest did not affect the validity of the claims, for the law for acquiring coal lands was exactly the same on the Forest as on the public domain outside. The Forest Service was brought

into the matter through its insistence that the mining laws be complied with on the National Forests before patent is issued. Many of these coal claims were finally rejected because there had not been a compliance with the law, not because a few of them were within the boundaries of the Chugach National Forest. Yet the impression has been spread abroad that in some way the Alaskan National Forests have interfered with the opening up of the coal fields, and this impression has been the basis for a great deal of hostile sentiment against the



A FOREST RANGER'S CAMP IN WINTER

A great deal of the work of exploration in the forests of Alaska is done in the winter. This is particularly true in those portions where swamps, streams, and muskegs make summer travel slow and difficult. The Forest Service has already done a great deal of reconnaissance work in the winter, with the aid of the dog sled.

existence of the National Forests. The Chugach again became a subject of public controversy in 1911, when an elimination of about 13,000 was made at Controller Bay. This elimination resulted in passing to private ownership a strategic location for a railroad terminal. Chugach Forest is now once more coming into prominence on account of the efforts to secure its entire abolishment and the throwing open of the land to general entry. The abolishment of either of the Alaskan Forests would be a very serious step backward; it would be a direct blow at the whole National Forest system, and an entering wedge to undo what has already been accomplished in public forestry.

The reasons for the continuance of the two Alaskan National Forests and their retention under National Forest administration are the same that underlay their establishment in the first place and the establishment of the National Forests in the States. A statement of these reasons would involve a description of the incidents which led up to the establishment of the National Forests, the depredations and frauds connected with the public forests before the establishment of the National Forests, the failure of private ownership to protect the interests which the public has in the good management of forests, the retarding influence of speculative ownership of timberlands on the development of agriculture, mining and other local resources, and the failure of private owners to protect their property or to provide for the perpetuation of the forests after cutting off the timber.

The continuance of the National Forests is necessary to secure adequate fire protection. I have already explained the danger of fire on the National Forests and how this problem is being handled. I have explained the great destruction in the forests on the public domain which are not under forest administration. The abolishment of the National Forests means the removal of the only organized forest protection that is being undertaken in Alaska today. The abolishment of the National Forests would invite destruction to all those portions of the forests which are subject to an annual fire hazard and serious damage to a large portion of the balance.

The abolishment of the National Forests would quickly put a stop to Government sales of timber such as are now being made and such as are anticipated in larger volume in the near future. Such sales would be stopped because the best timber would be privately acquired. Unbroken logging units would be a thing of the past. Private owners would quickly seize the strategic sawmill sites and permit operations only on such terms as they pleased to dictate. The orderly handling of the public timber in the public interest would no longer be possible. Under public ownership, the settler, the miner, and the industrial organization needing timber can secure it promptly and on reasonable terms, and they are assured of a continued supply protected from the exactions of holding concerns.

Adequate forest protection, the perpetuation of the forest resources at the same time with their full utilization, the protection of all the users of the forest resources fully insuring supplies to them at reasonable rates, and the making of other resources available for use side by side with the utilization and development of the timber are the particular public benefits which accrue from public forest administration.

GROWING FROM THE ROCK

MANY a traveler has saved himself from being dashed down a precipitate cliff or steep mountain side through the aid of some bush or tree, whose tough roots were entwined among the rock crevices. Throughout the entire Rocky Mountain area the tourist or the hunter from the East is struck with the marvelous capacity of the native trees for not only obtaining a foothold, but indeed making a vigorous and sturdy growth where there seems to be nothing whatever in fact but rock. Here and there may appear cracks in the solid rock of the mountain side holding a little coarse, dry, rocky dirt with about enough nourishment, one would think, to sustain a plant the size of a violet, or perhaps a tiny bush. Yet one frequently finds really large trees growing in just such places. On every hand may be practically solid granite, yet trees will grow out of it, and the most the observer can find are comparatively small cracks into which the roots disappear, completely filling them and even conforming to their shape. How the tree

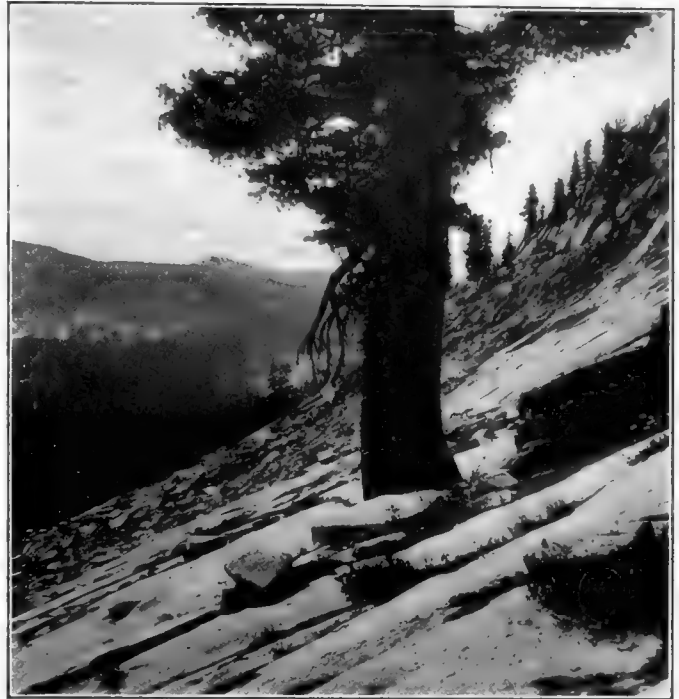


Photo by Gilbert, U. S. Geological Survey.

WHERE DOES IT GET SUSTENANCE?

How large trees can grow out of almost solid rock is a question which the traveler in the Rocky Mountains and the California Sierra constantly asks himself. In many cases there is also a dry season of months duration with which the tree has to contend.

shown in the photograph, which is growing out of an apparently solid mountain of granitic rock at King's Canyon, California, can get enough of either water or plant food is a puzzle for which close examination offers only partial solution.

COLORING IN REDWOOD CONES

By O. E. JENNINGS

I WOULD like to call attention to the rich coloring matter contained in the cones of the California redwood.

While preparing for the herbarium of the Carnegie Museum at Pittsburgh some specimens of the redwood which were collected near the Muir Woods early in September, 1915, the twigs, with cones and leaves attached, were sprayed with a weak solution of bichloride of mercury in denatured alcohol, to which a small quantity of glycerine had been added. Upon the application of the solution to the cones the surplus liquid running out upon the sheets from them was noticed to be of a brilliant magenta-red color. A small quantity of the fluid was drained or into a bottle and now appears to be a rather transparent rich magenta in color.

This note has been written with the thought that possibly this coloring matter may not have been noticed before and that possibly it might be of some economic value. So far as I have been able to learn from the literature examined, it has not been listed among the organic dye-stuffs.

The Bird Department

BY A. A. ALLEN, PH.D.

Assistant Professor of Ornithology, Cornell University

OUR WINTER BIRDS AND WHAT THEY DO FOR US

NOW that the greater part of the country is covered with snow and ice and all nature seems inanimate, one's interest is greatly heightened in the few bits of life that still remain active. Tracks in the snow tell us of the nocturnal wanderings of a few furry mammals that still find food and need not hibernate. A twitter in the hedgerow or a call from the woods announces the presence of some fluffy ball of feathers that has withstood the storms and watched the departure of his fellows; but everything else is sleeping.

We are constrained to wonder what law ordains that these few hot-blooded sprites shall brave our winters and eke out their existence in a frugal dormant world instead of migrating to a land of plenty. There are some, of course, which feed upon seeds and we can understand how



DEATH ON RODENTS

A screech owl. Every owl requires the equivalent of over 1,000 mice a year in order to live, and they are the most potent checks upon the increase of the dangerously prolific rodents.

they might still find food, and there are some which feed upon small rodents, and these, too, we can comprehend. But among our winter birds there are some which we know feed almost entirely upon insects and it is these that astonish us. How can they find sufficient food even to supply the energy necessary to keep them warm when every insect has apparently disappeared from the earth? Truly it is one of nature's paradoxes.

But had we the eyes of birds we would know that insects have not disappeared entirely. The tent caterpillars which denuded our orchards of their leaves during the summer, transformed into moths before fall, which laid their eggs in little varnished packets on the outer branches of the trees. In this stage they are passing the winter and next spring hundreds of little squirming caterpillars will hatch out and begin at once spinning the "tents" to pro-

tect themselves from the hungry birds. They will thrive and grow fat until every leaf is stripped from the branch upon which they were hatched and then they will migrate to other branches, until finally the whole tree stands shivering in the summer breezes. They will acquire long spiny hairs all over their bodies so that few birds, except the cuckoos, will eat them. And the next winter there will be hundreds of little packets of eggs instead of one. But at this point a flock of ever-hungry chickadees will happen to come and, with their beady eyes, they will spy out these tiny lunch baskets and, finding food plentiful, they will stay until every egg has been eaten. The next year there will be scarcely a tent caterpillar on the tree.

Or perhaps it was the canker worms that denuded our elm trees.



AN INSECT DESTROYER

A chickadee. It is the only bird that deposits the moths' eggs in the tent caterpillar's nests. It passes the winter in the nest, and at this time it is being protected by the downy woodpecker.



AN ASSAULT ON BORERS

A downy woodpecker with a billful of wood-boring larvæ for its young. In winter as well as summer the woodpeckers go about their work of destroying borers.

Every leaf supported a dozen worms and when we jarred a branch, hundreds of them dropped toward the ground on silken threads by which they could climb back up to their work of destruction as soon as danger was past. So many of them were there that, in spite of the flocks of birds, including even house sparrows, which came to feed upon them, countless numbers reached maturity transformed into fluttering yellow moths, again escaped the birds and mated with the wingless females which were crawling around the trunks of the trees. Now that winter is here, all the moths have died, but on the bark are countless little clusters of eggs awaiting the spring sunshine to transform them into



A GREAT WEED SEED DESTROYER

A tree sparrow. The tree sparrow has been estimated to destroy over 800 tons of weed seed each winter in the State of Iowa.

ravenous worms. But such is not to be the case. Flocks of nuthatches and brown creepers are finding the store and will search every crevice in the bark until few eggs are left to hatch.

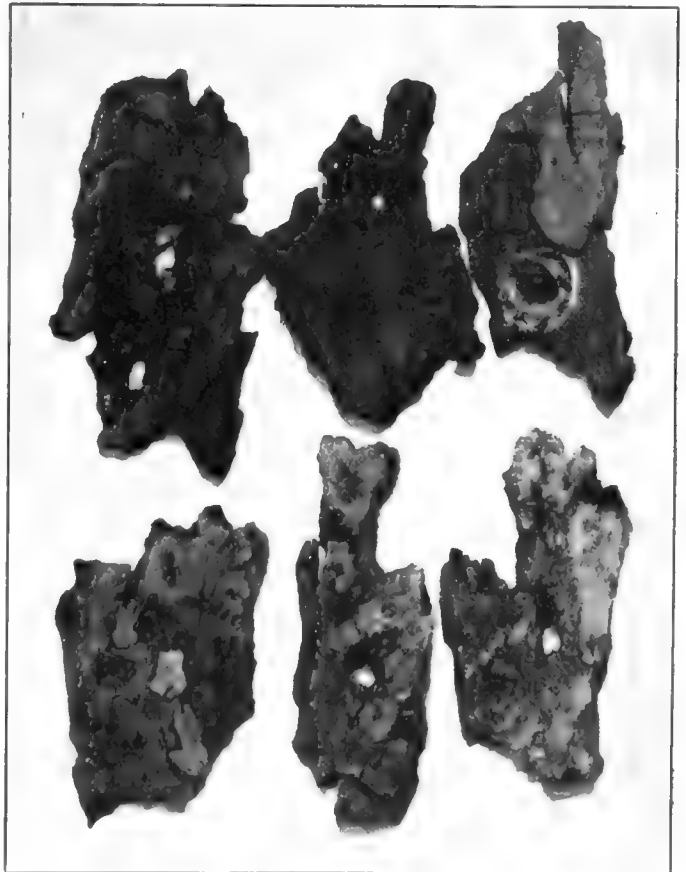
In the spring when the apples were just beginning to form, small brownish codling moths appeared and laid eggs upon the newly formed fruit. The eggs hatched, the larvae bored to the center of the fruit and before long the ground was covered with wormy apples; no crop was harvested. Unwittingly the apples were left upon the ground. The worms crawled out and climbing up the trunks of the trees, hid beneath loose flakes of bark, thus to pass the winter. The worms in the center of the apples were inaccessible, but now is the birds' opportunity. Downy and hairy woodpeckers flock to the orchard. Up and down the trunks they go tapping every loose piece of bark, stopping only long enough to drill small holes and extricate the larvae. The best way to control the codling moth, we are told in books on fruit insects, is to fasten pieces of beef suet to the branches to attract the woodpeckers. They will come to depend upon the suet to carry them through times of stress, but most of their day will be spent gleaning the larvae from under the bark.

It is during the winter that many of our insect pests are most easily controlled by birds, so whatever we do toward attracting and feeding them through these cheerless months is far more than repaid.

But all our winter birds are not insect eaters. What do we owe to these that spend their time gleaning the seeds of weeds? According to Professor Beal, of the Biological Survey, at Washington, a single species, the tree sparrow, consumes over 800 tons of weed seed every year in the State of Iowa alone. Single meals of such birds as the bob-white and mourning dove, as shown by the contents of their crops, have consisted of over 5,000 seeds of obnoxious weeds.

If we stop for a moment to consider the reproductive capacity of weeds we can appreciate the need of such efficient engines of destruction as the birds. A single plant of henbane, for example, bears annually 10,000 seeds. If all the seed should germinate and reach maturity, in less than five years there would be a henbane plant for every square foot of land on the globe. Other weeds are even more prolific. The many species of sparrows, in this case, the juncos, the redpolls and the snow buntings that twitter about our weed-grown fields and gardens are yielding us a service almost as valuable as are the chidadees and woodpeckers in the orchard and woods.

There is also a third group of birds, the hawks and owls, much maligned by the ignorant, some of which remain with us all winter. Most of the owls and some



EVIDENCES OF INDUSTRY

Flakes of apple tree bark showing the work of woodpeckers in destroying codling moth larvae and pupae. The lower row shows the holes made by the woodpeckers, the upper the empty cocoons.

of the hawks are permanent residents wherever found. Owls swallow their food whole, when not too large, and later eject the indigestible bones and fur in the form of pellets. Find a hollow tree or a thick evergreen where an owl is accustomed to roost and search the ground for some of these pellets. Examine them and see how few contain feathers or bones of birds and how many the skulls of the obnoxious mice.

It is well that we have such a natural check upon the



BONES AND FUR SWALLOWED BY OWLS

Some owl pellets dissected to show that they are composed entirely of the bones and fur of mice and rats. Owls swallow their food whole and later eject the indigestible parts in the form of these pellets.

increase of mice, otherwise we would be overrun with them. The common meadow mouse, for example, has six or seven litters a year and from six to eight at a litter. With thirty-five as a conservative estimate of the young of a female each year, in five years we could have from a single female nearly five million offspring, doing at least \$100,000 damage each year. Fortunately each owl requires the equivalent of over a thousand mice a year in order to live and few mouse families are allowed to multiply unchecked.

There have been a few cases, however, when mice have multiplied unchecked for some years and we have had the so-called "plagues of voles," or plagues of mice. An interesting sequel of these infestations has been that they have always been followed by flights of owls, the unusual abundance of food attracting them from all directions and causing them to remain until the numbers of mice have again been reduced to normal.

Thus we see that although all nature seems paralyzed in the grip of winter, there are still about us a few hardy birds that have remained to finish the work of pest destruction which the weaker species so ably commenced during the spring and summer. Laying aside, altogether, the pleasure which their society and friendliness brings to us, surely the little that we can do toward feeding them as their natural food supply becomes exhausted and as was described in the last issue of this magazine, is one of our best investments.

GIGANTIC STONE BUFFALO SKULL

THE plains of Montana were once strewn with buffalo skulls and some are occasionally seen today, although good specimens are becoming rather scarce. What to more than one traveler has at first appeared to be the huge skull of the father of all buffaloes has proven upon closer inspection merely a remarkable likeness—a wind-carved piece of stone. Many a hunter, doubtless, seeing this great "skull" has galloped toward it sure that he had found a wonderful trophy. As he approached he probably had misgivings,



Photo by Beckley, U. S. Geological Survey.

IS THIS A HUGE BUFFALO SKULL?

No, it is a peculiar rock formation on the Montana plains which at a distance resembles the skull of one of the great animals which once roamed these plains in herds of thousands.

owing to the great size of the specimen, unless perhaps he took it for the head bones of some extinct monster, the petrified remains of which are found in the West; for there would lie the great skull on its side in characteristic position, one horn pointing upward, the eye socket, and the frontal bone. A close look has always shattered the highest hopes, the "skull" proving to be about 6 feet tall and composed of stone. So there it has been left, to mystify the next unwary traveler.



WALK THROUGH THE THIRTEEN-YEAR-OLD PINE GROVE
Not only does the owner expect to make this pine yield him a handsome profit but while it is reaching a marketable size he has the advantage of it adding greatly to the scenic beauty of his estate as is evident by this photograph.



INSIDE THE THIRTEEN-YEAR-OLD PINE GROVE
Showing how scientific planting and proper care of the trees is developing a stand that in a comparatively few years will have considerable commercial value. Col. Lowden now plants 50,000 pine seedlings every year.

500,000 Pines Prospering

BY JOSEPH C. MASON

OUT in Oregon, Illinois, a scheme of reclamation is being worked out by Colonel Frank O. Lowden that is attracting the attention of forestry men all over the country. When Colonel Lowden began the development of Sinnissippi Farm on the Rock River, he found many apparently barren spots of sandy soil that offered an opportunity for experiment in tree planting. He determined to try pines. He started with seedlings. They grew rapidly and offered a suggestion that he promptly followed up. The accompanying photographs show the result. Here is a picture showing pines two and a half years old. Another picture shows an exterior view of a pine grove thirteen years old, this grove being the first planted by Colonel Lowden. A third picture is of a beautiful walk through the thirteen-year pines which are within a stone's throw of the Rock River. The fourth

picture is an interior view of the thirteen-year grove. For years the needles have been dropping from the trees and the ground is hidden beneath a light brown covering, soft and inviting.

Colonel Lowden's experiment ceased long ago to be an experiment and became a hardheaded business proposition. He abandoned the use of seedlings and substituted transplants. At the rate of 50,000 per year, he has dotted his farm with these slips of waving green until today he has 500,000 pine transplants and trees, varying in age from two to thirteen years, upon his farm. In a few years Sinnissippi Farm will be a great green spot, winter and summer. Many people in the middle west have never seen a pine tree, but they will be able to see them at their best only one hundred miles, as the crow would fly, west of Chicago.



THESE PINES ARE TWO AND A HALF YEARS OLD
They are part of the five hundred thousand pine transplants and trees upon the farm of Colonel Frank O. Lowden, at Oregon, Ill. Note the large yearly growth so plainly visible.



A THIRTEEN-YEAR-OLD PINE GROVE
This grove grown from seedlings on Col. Lowden's farm is an indication of how the planting has grown from an experimental to a hardheaded business proposition.

Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

REINFORCING TREES

BY HAROLD J. NEALE, *City Forester, Worcester, Mass.*

IT IS an accepted fact that shade trees on public streets increase property values. This of course is in proportion to the size and condition of the trees—as a small tree would not increase values very greatly while an old, weakened tree would be about in the same class, as far as value is concerned. The question arises then is it not possible to make these old trees safe and eliminate their weaknesses? They are the heritage of generations past and are a necessary adjunct to old settlements; as in New England where we have old colonial mansions with beautiful spreading elm trees as their proper setting.

On private lands these trees, set out many years ago, have had a free and easy existence and are in many cases sound and free from any weakness. The street tree of the same generation, however, has had a different battle to fight. Hitching horses to a ring bolt fastened into the trunk of these street trees or by throwing the reins around the trunk was not uncommon and was, of course, an invitation to the animal to gnaw and thus injure the bark on the trunk. This was immediately followed by the entrance of fungus diseases, causing decay and the gradual permeation of the mycelium or root hairs of the fungus which today leaves an ugly scar extending in many cases through the heart of the tree. This presents a proposition to the city forester or tree man. It is the proper procedure for making the thoroughfare safe for pedestrians.

With the aim of saving the old trees, making them safe, sound and healthy the arboriculturist of today is striving quite as much as he is in the planting of new trees for future generations to enjoy. Bolting insecure

limbs, chaining them and similar measures have been practiced for a number of years. In New England we see many large elm trees girdled by heavy iron bands which were improperly placed. In other cases heavy chains have been placed around limbs, not girdling them, but causing the bark to die on the side in contact with the chain. In some cases the bark and the cambium cover the chains, embedding them into the heart wood of the limbs and they cannot be discerned.



A METHOD OF TREATMENT

An elm which, despite its injuries, is still of value and worth preserving. If an attempt had been made to remove the decayed portions without reinforcing the trunk, the tree would probably have blown down, so an iron cable was fastened as shown in the right hand picture and tightened sufficiently to allow for the swaying of the trunk. The decayed portion was then removed and the cavity treated.

The process of bolting, although not difficult, requires a certain amount of study and care. Mechanical forces must be taken into consideration. The stronger of the limbs to be bolted must be used for the support and the bolt placed at right angles to the side of the weaker limb, otherwise the weaker does not receive the maximum pulling forces of the bolt, to hold it in place. In the case of a split tree the forces must be divided so that each limb is exerting an equal leverage on the other. The bolt must be placed as high as possible in order that it will be able to exert a maximum amount of tension with a minimum amount of energy. A bolt, however, should not be placed high enough to allow any swaying of the limbs, which would have a twisting effect on the bolt which would in time weaken and break owing to its inelasticity. In case this is necessary the bolt should be placed low and a chain or cable placed higher. The size of the bolt is also an important factor, and the growth of the limbs with their increasing weight must be considered. The placing of a bolt in a tree will not in all cases induce stronger growth, but it is necessarily a permanent factor in holding the tree together, while in others a bolt may be placed

for a precautionary purpose and as the tree grows it strengthens the weak places itself, but the bolt is always a reserve force. In boring the hole it is necessary to countersink through the bark and sufficiently into the wood to allow for the washer and head of the bolt or nut to be entirely beneath the cambium or living tissue. It should be disinfected and the washer and head or nut embedded in tar or paint to keep out moisture. The space around the nut can then be filled with elastic cement, allowing the cambium and bark to cover the area in time. The bark should be cut away slightly in a \diamond shape to allow proper healing without rotting of the bark as will follow if left rounded. This is the same process as is practiced in all scientific cavity work. The washers must never be placed against the bark as growth will immediately cease at the point of contact and decay will commence, which in time will leave the washer free or allow the split to open. Bolting is many times practiced unnecessarily, but if properly placed the bolt becomes unnoticed in time and is always furnishing an "ounce of prevention."

In cases where a bolt is not sufficient to hold the limbs it is best to chain or cable them. This allows for any necessary swaying. The chain or cable is held by eye bolts, which are placed in the same manner as the bolts, with nuts embedded and the pulling forces at right angles to the supported limbs. The threads on the bolts are made longer than necessary to allow for taking up the slack and are cut off when the chain is in its final position. A set of strong blocks or a lineman's "come-along" are a great help in drawing the limbs together as they can be placed much farther out on the branches and therefore exert a greater influence with less energy.

During the past few years different methods of chaining and bolting have been tried and the use of wire rope cable has proved very satisfactory. Its breaking strength is much above that of the same size chain and while the chain is only as strong as its weakest link a wire rope cable is not weak in any unit if properly made and tested. It is pliable, easily established and practically unnoticeable, especially when the tree is in full foliage. This wire rope cable is fastened by clamps or in some cases by tying or splicing. It is very essential that the wire rope be of sufficient size to hold the load that is placed on it and of more importance that eye bolts be strong enough, especially in the eye, which, in many cases, are made by blacksmiths, who do not pay proper attention to the temperature of the iron when it is made. It should always be subjected to a test that will insure its being equal to the strength of the cable and thus to be able to hold its part of the load.

There is another phase of the strengthening of the tree which to my mind has never been seriously considered. Illustration No. 1 is an elm tree which although not extremely large is of sufficient value to the abutting property owner to make him willing to spend some money in saving the tree. The tree is on an important thoroughfare which many people pass daily. Its exposure is such that a twisting wind storm would be liable to blow it

down. Its trunk was perforated with mycelium and decay penetrated more than half way through. If an attempt had been made to remove the decayed portions without reinforcing the trunk it would, in all probability, have blown over. Therefore, an iron cable was fastened to three eye bolts, as seen in illustration No. 2. This cable was tightened, but play enough has been allowed for a swaying of the trunk in any direction. The decayed portions of the wood were then removed and the cavity treated with creosote and tar and will be left exposed in this manner for the winter when an examination will be made to ascertain if the fungus has been entirely eliminated and when such conditions exist it will receive a proper filling, mostly for appearance sake as filling does not seem to materially strengthen a tree or eliminate diseases or insect invasions. There are, of course, many ways in which this cable can be placed, taking into consideration the weight of the top of the tree and the weakened condition of portions of the trunk will necessitate the placing of the cable in different positions. On some trees it would be necessary to use a much heavier cable than others. The forces could be mathematically computed and proper wire and position for fastening could be figured.

This is but one of the many problems which confront the forester of today and if by this simple method the priceless trees of our ancestors can be preserved, protected and made safe for this public there should be less use for the axe along our highways.

TREE WORK FOR JANUARY

1. Remove all the dead and diseased trees that were marked last Fall. In removing these trees be careful not to destroy the undergrowth of valuable shrubs and young trees. In most cases it will be necessary to first cut off the first large branches before felling the main trunk and in some cases it will even be necessary to remove the trunk in sections. By means of ropes the various parts may be lowered in suspension from neighboring trees without allowing them to come down with force on the growth underneath. In piling up the wood it is also wise to keep the diseased and infested parts apart from the good wood so that in the spring if it becomes necessary to keep some wood on the premises, one can be sure to keep only the good wood and destroy the wood which is liable to spread insects and disease.

2. All the brush should be burnt while the snow is on the ground in order to prevent fire.

3. Take care of all wounds. On most ornamental trees on the lawn and on many trees in the woodland one will generally find shallow wounds that need attention. Bruises and fire are generally responsible for these wounds. The bare wood exposed to the weather softens and attracts disease and insects, which eventually injure the main body of the tree. This month is an excellent time for attention of this character. The edges of the wounds should be freed from loose bark and the exposed wood should be covered with coal tar.

If the tar is found to be too thick in cold weather, it may be thinned down by mixture with some creosote. Some persons use paint in place of tar; but the latter is preferable because it does not peel in course of time as paint does and possesses better antiseptic qualities than paint.

QUESTIONS AND ANSWERS

Q. How may I tell whether my tree is ailing?

M. B. M., *Plainfield, N. J.*

A. So much depends upon the special local conditions that it is difficult to set up any series of symptoms. But in a general way the layman may surmise trouble when he finds any of the following conditions: Pale leaves in summer time when they should be perfectly green. This may indicate an excess of foreign gases or salts. Dead tops indicate root trouble and fungous growths protruding anywhere from the trunk or branches indicate decay underneath. Withered leaves show growth or inability to take in the requisite amount of water, though the water may be present in the soil.

Q. What trees and shrubs will stand the shade?

L. A. F., *Sewickley, Pa.*

A. Beech, hemlock and dogwood are best suited for that purpose. The maples will also tolerate considerable shade, but the beech and hemlock will stand very deep shade.

The following shrubs will be found suitable for planting in the shade of other trees: Blue Beech, Juneberry (*Amalanchier botrapium*), Spice Bush, *Azalia Nudiflora*, Red Berried Elder, *Vib Urnum Prunifolium*, *Viburnum Alnifolium*, *Viburnum Cassi Nodes*, *Viburnum Acerifolium*, Sweet Peppercorn, Witch Hazel, Mountain Laurel, *Rhododendrons*.

Q. When shall I prune my fruit trees?

A. L. C., *Nashville, Tenn.*

A. In March.

Q. What pruning tools do I need for my 12-acre estate?

A. K., *Joplin, Mo.*

A. Two small, single edged hand saws, 1 pole saw, 1 pole shears, 1 30-foot extension ladder with hickory rungs, 1 12-foot single ladder with hickory rungs, 1 lineman's belt, 1 pole brush for tarring wounds high up on the trees, 1 small brush for tarring small wounds lower down, 1 heater, to heat the tar, 1 3/4-inch chisel, 1 1/2-inch gauge, 1 mallet, 1 keg refined coal tar, 5 gallons creosote to mix with the tar.

Q. How far apart shall I plant Norway maples in front of my house on the city street?

C. C. J., *Worcester, Mass.*

A. Thirty to thirty-five feet apart.

Q. Have you had any experience in clearing weeds from a lake or pond in which the depth of water varies from two to five feet?

E. S. P., *Buffalo, N. Y.*

A. Take Portland cement and throw broadcast on the water, quite thickly, twice within one week and once

again in a month or six weeks. This will look white on the surface of the water for a while, but in a few hours it sinks, leaving the water thoroughly clear.

Q. What is the best spray for the cottony scale, and when should it be applied? Is winter spraying ever advisable?

W. W. M., *Rogers Park, Ill.*

A. The cottony maple scale can be sprayed effectively with a ten per cent solution of kerosene emulsion in early June, at the time when the young appear. A forcible spray of water will often dislodge the cottony masses and scale. On small trees, brushing off the insects with brooms dipped in kerosene emulsion has often worked well.

Q. Why is the English practice of root pruning on fruit trees growing strongly to tops, but not bearing fruit a help to increase the amount of fruit, if at all?

W. W. M., *Rogers Park, Ill.*

A. The practice of root pruning fruit trees for the purpose of increasing the fruit product is a very good one, especially in old trees where the main roots have been allowed to grow at the expense of the fibrous rootlets. In connection with this work I would suggest that you thin out the crown and cut it in quite severely.

Q. Do you advise the use of asphaltum after pruning and as a wound dressing?

W. W. M., *Rogers Park, Ill.*

A. I have never used asphaltum for covering roots, and on general principles would prefer a refined coal tar which I know from experience as having the penetrating and antiseptic qualities required for protection against fungous attack. If your coal tar is too thick, you might thin it down with a refined grade of creosote.

Q. I am building a residence located on a hill, or butte, about 1200 feet long and 600 or 700 feet wide at the base. I wish to cover the hill with some low-growing, hardy bushes with compact tops, something that will never grow high and which will thrive without much water and cover the hill fairly well so as to amount to a jungle or thicket. Or, I may conclude to plant grape vines to cover the entire hill, if advisable. The top of the hill is a graded plateau about 180x250 feet in area and this I will cover with that rich and always handsome forage plant, alfalfa. Over against this hill, which is a detached elevation standing by itself at the mouth of a broad canyon, I intend to make a spread in the way of California poppies. It will be a "field of the cloth of gold." I shall greatly appreciate a list of the shrubs and vines which will be likely to thrive on my "oblong hill," bearing in mind that they must be dry-climate plants, not requiring any excess of water.

H. G. O., *Los Angeles, California.*

A. The coral berry *Symphoricarpos vulgaris* would probably be as satisfactory a plant as any to use on your hillside. This plant roots from the tips of the branches and spreads quite rapidly. It will attain a height of 3 or 3 1/2 feet and succeeds well in dry soils and under adverse conditions. *Ampelopsis* of some species or variety, or some of the nearly related *Vitis* or grapes could be successfully

used, and the sand verbena would be very satisfactory also. *Lycium chinense* is also frequently used for covering rough banks, but I have an idea that the *Symphoricarpos* would be better, but if you desire a variety of material some occasional clumps of this material could probably be used to advantage. Your "field of the cloth of gold" should be most beautiful, and the alfalfa is a very practical idea.

A RECOMMENDATION

BY HON DAVID F. HOUSTON,

Secretary of Agriculture, Vice-President American Forestry Association.

IN his annual report to Congress Secretary of Agriculture Houston makes the following recommendation relative to the purchase of forest reserves in the Southern Appalachians and in New England: "The wis-



HON. DAVID F. HOUSTON

Secretary of Agriculture, vice-president American Forestry Association.

dom of retaining the western forests under national control is indicated by the course which the Federal Government has found necessary in dealing with the mountain lands of the East. These lands passed into private hands directly from the States. Their present condition furnishes an example of what happens when mountain lands are controlled by individuals. The results became apparent years ago. Erosion, loss of soil, and clogging of streams with silt and stone followed the removal of the timber. Stream flow became more irregular and great losses resulted to property through increased floods.

"It was necessary in the East to acquire by purchase the same class of lands which in the West were put into national forests merely by proclamation. An appropria-

tion of \$11,000,000 was made for these purchases to be expended during the fiscal years 1910 to 1915.

"The funds made available under the first appropriation are nearly exhausted. In its report to the Congress for the fiscal year 1914 the National Forest Reservation Commission recommended that purchases be continued until about 6,000,000 acres shall have been obtained and that the Congress authorize appropriations through another five-year period at the rate of \$2,000,000 a year.

"As fast as the eastern lands are acquired they are placed under an administration similar to that of the western forests. Situated for the most part near densely populated communities, the resources of these lands are readily available. There is immediate need for their timber, mineral, water, and forage resources, and also for their development as recreation grounds. Purchases should continue until areas sufficient to be influential in protecting the region are acquired."

THE THIRTY-FIFTH ANNUAL MEETING

EVERY member of the American Forestry Association who can possibly do so, is urged to attend the thirty-fifth annual meeting, to be held in Boston, Monday and Tuesday, January 17 and 18. Headquarters and meetings at the Copley Plaza Hotel.

Governors of several of the New England states will be present and they have also appointed state delegates, while every city and town of importance in New England, together with most of the organizations interested in forestry conservation, have selected delegates to represent them. It is expected to prove the greatest gathering of forestry interests that has even been held in any part of the United States.

Governor McCall, of Massachusetts, and Representative Gordon Lee, a member of the National Forest Reservation Commission, will be the guests of honor at the Forestry Dinner on the night of January 17, and there will also be several other noted speakers.

The chief topic for the meetings and the banquet will be the effort to secure an extension of the Weeks Law appropriation for the purchase of Federal Forest Reserves in New England and the Southern Appalachians, and there will also be reports on national and state forestry and municipal forestry, shade tree planting, diseases and insects which attack trees and on other phases of general and local forestry work.

Tickets for the banquet are \$3 each. Reservations should be made at once; both ladies and gentlemen are to be present. Write to the American Forestry Association, Washington, D. C., for reservations.

RECOMMEND A NEW MEMBER

A sample of AMERICAN FORESTRY will be sent to every person recommended by a member.

Children's Department

Devoted to imparting information about trees, woods and forests to boys and girls so that they may grow to know how necessary trees are to the health, wealth and future of their country.

BY BRISTOW ADAMS

WE have seen how the individual trees grow either from seeds or by means of sprouts; we have taken up the different steps in that growth, and the manufacture of the food of the tree into living tissue which is converted into wood. In the first article something was said of the differences between tree growth in the forest and in the open; and in the little Christmas story with the three trees personified, some further facts were set forth about the growth of trees in a community.

The difference between the study of forestry and tree study is that the forester devotes practically all of his attention to the behavior of trees in the larger groups. Here they cannot act independently, but act and react upon one another, helping sometimes, and hindering at other times. In the long run, however, the forest community is of benefit to the members which are able to win out in the first struggles, and can hold their own until they have reached full growth.

This has been called by Charles Darwin "the survival of the fittest," or in other words, those forms of life which are able to fit themselves into their surroundings are the ones which keep on growing. They have won out in what Darwin also characterized as "the struggle for existence."

In no place is this struggle for existence more severe and more exacting than in the forest. Even before Darwin announced his discovery of these principles, which changed the whole trend of science, a man who was partly a forester had the same thought that Darwin later gave to the world. Darwin himself gave this forester full credit.

The man's name was Matthews. He was a designer of ships, and in those days ships were all built of wood. In his study of the kinds of trees which were best suited for masts, he found that the straight, and tall, and slender trees without branches except at the top were the ones to be used. From that point he studied the conditions which produced such trees, and found that the conditions could be had only in a closely grown forest where the trees had to continually reach up for light, and where the lower branches were shaded out and died, the trees in this way becoming self-pruned, as the foresters say. The small twigs that dropped or fell to the ground, and with the leaves which were shed by the trees each year, went to form the forest soil or forest floor.

THE forest, then, is a great room, or nursery, made up of families, with parents and children. On the ground is this forest floor, and at the top, or ceiling, next to the sky is the forest canopy of green

branches. Each of these has its use. Many writers have noted this roomlike character of the forests. Some have spoken of the aisles made by the forest trees; our American poet Bryant says "The groves were God's first temples;" and architects have found inspiration in the trunk and branch forms of the trees for some of their most wonderful buildings. For our purposes, however, the forests are tree homes.

NATURE is always wasteful. She spreads her gifts like a spendthrift. If a forest is to be grown, nature produces thousands, even millions of seeds, yet only a small part of these grow to be trees. Nature thus provides for those that may be eaten by beasts and birds or those that may be destroyed by other means. Then, after the seeds have been sown by the wind and have found resting places in the forest soil, and the little seedlings peek above the ground, the fierce struggle begins. Each one crowds its neighbor, trying to get all that it can use of the light, and warmth, and moisture. For one reason or another, certain individuals become stronger than their fellows, and are therefore able to get more of the good things of life. It is very strongly a case of "To him that hath shall be given." The smaller trees thus get crowded out. The battle goes on during the whole life of the tree, and "the battle is to the strong."

THIS is the time of year to see how this battle goes forward, to see how the trees have to set themselves one against another. If you go out into the thick high woods now and look up, you will see that the crowns of the trees nearly fill all of the overhead space. Each tree has reached up, struggling to get ahead of the others, looking for its place in the sun, because without this place, the leaves can not digest the food which makes the tree grow.

IN your walk through the woods you will find some open spaces. Possibly an older tree has decayed and fallen, or man has cut out for his own use one or more trees, and has left an opening in the canopy, or crown cover. On the ground you will see the stumps, and you may be sure that there was no vacant space overhead when the trees were standing. Unlike the ground where the trees are thick, this space will be covered with brush which may not look like a forest growth, but at least is the beginning of one. Here are the young trees—the children of the forest—struggling against one another for light and place. Spreading bushes may seem to be trying to check the tall, slender

striplings back, yet some of the latter are managing to get through, and once clear, they will shoot up fast because they will then be fully entered on their race for life. As their tops close together the slower ones will in turn be shaded out even though they may have survived the first struggle. The shade will deepen; their stems will not be able to thicken up because they will not be able to manufacture plant food. Then will follow the successive deaths of those which are the least fit to survive, and the open space which you see now will in a few years be occupied by not many more trees than were originally there.

If you look about you will find certain trees that are crooked or lopsided, with all of their branches to one side where they could more readily get at the light, away from some tree which is crowding them. Some trees have fitted themselves to survive under dense shade, and can hold on to life for many years, waiting to take their places in the upper stories of the forest when openings occur.

Yet as we have seen in the earlier articles, it is not always a struggle. The older trees are not only the parents, but are actually the nurses of the smaller trees. They protect them from the fierce heat of the sun, which would soon wither a growth which has become accustomed to coming up in the shade. They protect the smaller trees from winds and from heavy snow and sleet, which would break them down while they were still young if it were not for the nurse trees or big brother trees that take the brunt of the storms. These phases of the life stories of the trees the forester has to read, and indeed, to know by heart. He is able to overcome some of the wastefulness in nature, and he can so manage the forest that he can help to grow better trees than can be grown by nature unaided.

But the man who does not think of forestry is likely to add to nature's wastefulness. If he goes into the woods to get fence posts, or repair material, or logs for the sawmills; and if he cuts out the best trees of the most valuable kinds, his timber tract will be getting worse and worse all the time. Those trees which he does not want and can not use will be left to take the place of the good ones which he cuts, and in the course of time he will have a woodlot made up of timber weeds. The forester, on the other hand, will see that enough of the good trees are left to furnish a succession of crops, and to furnish seed for future crops. He will destroy the trees that are of no use to him. In New York, for example, he will get rid of dogwood, the scrub oaks, and gray birch, and will favor hickory and white oak in a hardwood stand. In most places in the state where white pine grows successfully, he will favor white pine. In a shorter time than nature can bring it about, he will have a well-stocked stand of useful trees.

It can be seen, therefore, that when man enters the fight, which the trees are waging against each other, he will throw an advantage to some trees and will put obstacles in the way of others. If he knows the ones to favor, he will increase the usefulness of the forest to

man, but if he interferes blindly, taking the best of what he wants, he is very likely to throw the balance against the very trees that he ought to have.

This is the reason why everyone should know something about forestry, and should learn to use his or her eyes in the woods to see how the trees grow, how they struggle against each other, and how they help one another. If one does this, he will soon get acquainted with the general facts of forestry, and will know the trees with an intimate and personal feeling which is much better than merely knowing their names. He will realize why the foresters make shade frames over the seedling beds in the forest-tree nurseries, and will realize also why the foresters in setting out plantations will supply what are known as nurse trees, either to furnish shade or to stimulate the young trees into the necessary upward growth.

The next story will tell about the different kinds of trees, but in a new way, not according to their family relationships as the scientists know them, but according to their uses to man.

STATE FORESTRY IN COLORADO

AS the greater portion of the timbered area of Colorado is protected by the National Forests, the State Forester, W. J. Morrill, is bending his energies toward encouraging tree planting, and the preservation of fence posts in the plains region of eastern Colorado. He has just returned from a five weeks' lecture tour in that part of the State, where he had charge of farm institute work, the team comprising a dry farming expert, a dairyman, and the State Forester. Institutes were held in twenty-seven communities, good interest being shown in all places.

Much of the land has been homesteaded during the past ten years; the farmers generally are prosperous, and the time is propitious to advocate tree planting for windbreaks and the ornamentation of dooryards. In most places visited, the black locust, next to poplars and native cottonwood, is most commonly planted, as borers are attacking the former species only in a few localities. Mr. Morrill is advocating in much of the territory visited the "roof scheme" for windbreaks, using the black locust for the center row, honey locust for flanking rows, and a border of tamarix, Russian olive, and wild plum.

He also exhibited a model of a farmer's fence-post preserving plant for the open-tank treatment of posts, but also strongly recommended the brush treatment with coal tar.

It is probable that a State nursery will be established next spring at Fort Collins, to supply suitable stock at cost of production.

Villages in the State are also becoming interested in reform in street planting, and interest is being shown also in the landscaping or planting of village and rural school grounds.

designates the areas purchased and the areas examined for purchase and then in recommending further appropriations says:

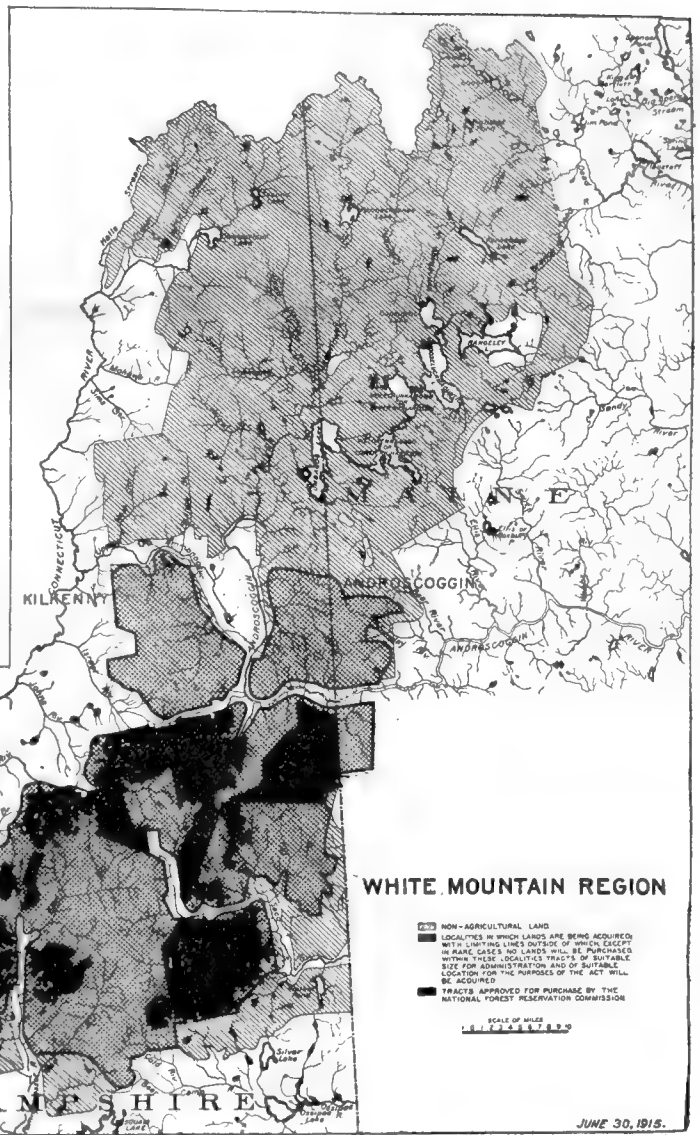
Appropriations for purchase ceased with the fiscal year 1915. The balance which remained unexpended at the close of the year will be used largely to fill the gaps between the lands which have already been acquired so as to better fit them for administration. In its last annual report the Commission stated that it is practicable for the Government to acquire lands of the character desired in sufficient area for successful administration and at reasonable prices. By the employment of condemnation where titles are defective, a safe title may be vested in the United States.

The wisdom of the Government's acquiring and administering extensive bodies of forest land at the headwaters of the great navigable rivers has become entirely clear. Far-reaching good will result in safeguarding the streams from erratic flow and in protecting the watersheds from destructive erosion to which they are subject when unwisely cleared. A basis will be afforded for permanent industries in regions which otherwise are in danger of ceasing to be productive and of becoming a menace to the navigable rivers and to the communities situated upon them.

The appropriations which were made have been sufficient to start the work and make very substantial progress. Through the care exercised in making purchases the lands acquired are so well situated for administration and use that even should appropriations cease considerable good would be accomplished. But the progress should not stop at this point. It should go further. However, the Commission does not

look upon the program as requiring expenditures through a long period of time, but rather through only a limited number of years.

Renewing its recommendations of last year, it is the judgment of this Commission that the work can best be done under appropriations covering periods of five years each, the appropriations becoming available annually and remaining available until expended, as is now the case. Experience has shown that it is impracticable to at-



tempt to do this work under appropriations which expire with the fiscal year. It is also of the utmost importance that appropriations be continued through periods of not

less than five years. When the work was begun a force of timber cruisers and surveyors had to be assembled and trained, a task which required two years. It would be most unbusinesslike to have to disband this force on account of a gap in the appropriations. If purchases were suspended it would also require much time and expense to build up a new force and get under way again the negotiations that would be broken off. Many of the cruises and

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- HON. H. M. JACOWAY, Dem., Dardanelle, Arkansas.
- HON. JOHN V. LESHER, Dem., Sunbury, Pa.
- HON. MICHAEL K. REILLY, Dem., Fond du Lac, Wisconsin.
- HON. DUDLEY DOOLITTLE, Dem., Strong City, Kansas.
- HON. JAMES T. McDERMOTT, Dem., Chicago, Ill.
- HON. ARTHUR W. OVERMYER, Dem., Fremont, Ohio.
- HON. THOMAS J. STEELE, Dem., Sioux City, Iowa.
- HON. GILBERT N. HAUGEN, Rep., Northwood, Iowa.
- HON. JAMES C. McLAUGHLIN, Rep., Muskegon, Michigan.
- HON. WILLIS C. HAWLEY, Rep., Salem, Oregon.
- HON. JOSEPH HOWELL, Rep., Logan, Utah.
- HON. HENRY T. HELGESEN, Rep., Milton, North Dakota.
- HON. SIDNEY ANDERSON, Rep., Lanesboro, Minn.
- HON. WILLIAM B. WILSON, Rep., Chicago, Illinois.
- HON. CHARLES B. WARD, Rep., DeBruce, Sullivan Co., N. Y.
- HON. J. KUHIO KALANIANA'OLE, Rep., Hawaii.

examinations which have been made and which had not resulted in purchases would have to be made over again and the intimate touch with the land situation which is now enabling purchases to go forward smoothly would be lost. From every point of view it is highly desirable that appropriations continue without a break.

It is again emphasized that the Congress established this project upon the basis of an appropriation of \$11,000,000. One million dollars appropriated for the year 1910 never became available at all. Instead of hastening into purchases in order to utilize the appropriation for the year 1911, which would have been unbusinesslike, and would have resulted in loss to the Government, the Commission adopted the conservative policy of making purchases only after full information had been secured in regard to each tract and reasonable prices had been obtained. By so doing it established the work upon a sound basis, but nearly all the \$2,000,000 appropriated for the year 1911 reverted to the treasury. These appropriations which were not utilized ought to be reappropriated.

In the judgment of the members of the Commission the work should be carried forward in a steady, systematic way. Since the existing appropriations ceased with the fiscal year 1915, it is recommended that action be taken by the Congress during the present session to continue the appropriations at the rate of \$2,000,000 per year from the fiscal year 1917 to the fiscal year 1921, inclusive, and that it make all the appropriations available until expended.

CORNELL SUMMER FORESTRY CAMP

FROM July 19 to September 21, 1915, the professional forestry students in the Department of Forestry at Cornell University were in camp in the Adirondacks. These ten weeks formed a regular part of the work of the third term of the New York State College of Agriculture, the first six weeks of the term, June 7-July 17, being spent at Ithaca.

The camp was near Lake Ozonia, St. Lawrence County, in the western part of the Adirondacks, about thirty miles from the Canadian boundary and fourteen miles from the nearest railroad station, St. Regis Falls. It was in the midst of timberland being logged over for several large commercial companies, so that the students had opportunity to observe lumbering operations at close range.

Besides the lumbering work the students were given regularly scheduled examinations and reports to hand in promptly. This, with their courses in silviculture, mesuration and forest utilization, kept them very busy with little time for recreation. To go to the Cornell forestry camp is not like taking a summer holiday, the students say. The camp itself was between two lumber camps and near a saw-mill. It was on a timber tract of eight or nine thousand acres belonging to Mr. F. A. Cutting of Boston. Beech, birch, maple and hemlock were being cut out.

Two summers of this camp work are required as a regular part of the professional course leading to a degree in forestry at Cornell. In addition the students must put in three months, in the autumn of the senior year, in obtaining practical experience in lumbering and logging. One of the students at the close of camp decided to remain as a "lumber jack" at a neighboring camp and get off his experience. He will be there during the fall and winter. The other seniors found jobs in other logging camps elsewhere in the Adirondacks or in New England.

One of the pleasant features of the camp was the fact that the professors in charge were on the same footing as the students. The boys built a dam and every morning between 5 and 6 o'clock, faculty and students rose and took an icy plunge in the stream. Most of the men were athletically inclined. One is a crew man, two are on the varsity swimming team, one is an inter-collegiate miler and another is on the cross-country team. Long tramps to places of interest, from the point of view of logging, were taken on several occasions and the professors held their end of the affair up well, even if competing with such a well set-up, muscular lot of young men. A man who visited the camp said that they were indeed the "cream" of Cornell students as to physical development.

One of the features of the camp was the camp fire. On the last night, an immense camp fire was built and all the lumber jacks in the camps around were invited over. About a hundred came. They sang songs and did stunts. Many of the lumbermen were Canadian and French.

When camp broke up the boys went to Dickenson, where the camp cook lived, and gave a free concert to show their esteem and affection for him. Everybody in town came. What took especially well was the college yells. The Cornell boys gave their own and every other yell they could think of and then made up some when the audience kept on clamoring for more.

The three faculty members who carried the burden of the work in camp were Professors A. B. Recknagel, J. Bentley, Jr., and Samuel N. Spring.

The student body numbered fifteen seniors and five graduate students. The latter will receive the degree of Master in Forestry in February, 1916.

WOODSTOCK'S LAUDABLE WORK

Woodstock, Vermont, a village of about 1,700, has an Improvement Society, which for several years has kept the streets and little squares and corners of the village immaculately neat, and has done a number of other interesting and useful things. This society has now decided to establish in the center of the village what it will call, for lack of a better name, a Botanical Garden. Its purpose is to call attention through this garden to the value for decorative purposes of native trees, shrubs, flowers, ferns, mosses and climbers.

Editorial

THE WOODLOT AND THE SMITH-LEVER BILL

SINCE 1862 the national government has made annual appropriations for the encouragement of agricultural experiment stations. In 1890 these amounts were increased and the scope of the work extended. The policy underlying these appropriations has been the uplifting of the entire practice of agriculture through the dissemination of useful and practical information among the farmers.

In the course of fifty-three years of trial the problem as to how to reach the farmer most effectually has at last been solved. Not by issuing bulletins crammed with useful facts—though these have their place—not even by public addresses at farmers' institutes—though the personal contact thus secured did far more than the written word—have the best results been obtained, but by the method of personal work with the individual on his own farm—by local demonstration of the methods advocated.

In 1914 Congress sanctioned this final step, by passing the Smith-Lever bill. The funds provided are forthcoming whenever state legislatures, colleges, local authorities, associations or individuals in a state first contribute an equal amount. The money must be used solely for instruction and practical demonstrations in agriculture and home economics to persons not attending schools or colleges. Only 5 per cent can be spent for publications.

Starting with \$480,000, or \$10,000 for each state, the fund available increases annually, by half a million dollars until, inclusive of the original sum, it reaches a total of \$4,590,000 per year. The surplus above \$10,000 is to be proportioned between states on the basis of the rural population, as determined by the last census.

To forestry, this legislation presents a tremendous opportunity and a great responsibility. Under the terms of the law, subjects relating to agriculture may be dealt with, and under this head comes the farmer's woodlot. The value of the woodlot to the farmer is expressed in many ways. It furnishes fuel, at the same time providing employment for labor in the winter or slack season. This enables the retention of help the year round. Fence posts and other local supplies are produced, or the better class of logs sold profitably to woodworking industries. The grove affords protection, acting as a wind-break, reducing evaporation and giving shelter to stock in adjoining fields.

The presence of a woodlot adds to the desirability and sale value of the farm and this advantage increases in regions otherwise treeless. It makes life more worth living to own even a small tract of woodland from which grazing is excluded, and which soon becomes the home of many wild plants, flowers and birds.

No matter how rich the soil, it will pay every farmer to devote a portion of his acres to a woodlot; and when, for any reason, he possesses waste land—either the steep banks of streams, or ravines, or rocky patches, he should think twice before condemning these areas to a policy of denudation and grazing.

The aggregate amount of waste land owned as portions of farm units is enormous. Scattered as it is in small tracts, it will never be possible for either state or nation to own and manage these true forest areas, for the cost of administration would be prohibitive. The farm owner is the man to do it. The time and attention required fits in with the economy of the farm unit. This means efficiency. Every land owner owes it as a duty, not only to himself, but to the community to make his acres productive—yet through lack of interest or incentive he too often neglects altogether the potentialities of his forest land, permitting it to burn over or to seed up with tree weeds of little value even for fuel.

If the plan of personal demonstration and persuasion is applied to the problem of the farmer's woodlot *the same beneficial results will follow as have already been secured by the county agents operating under the Smith-Lever appropriations.* But this work should be done directly by trained foresters. The agricultural agent, engrossed in his subject, can be expected at most to give the woodlot problem his sympathetic appreciation, but should not be required to add technical forestry to his attributes.

The state experimental stations, or the state legislatures, should promptly appropriate funds sufficient in each state to employ at least one technical forester next year in addition to the present state organization such as it may be. This forester, working under the direction of the proper authority, to be determined for the individual state, should devote his entire time to woodlot forestry, along the same lines as are now pursued by the agricultural agents. If the work is started in this manner, it will become permanent. Forestry should ultimately claim from 10 per cent to 20 per cent of the Smith-Lever funds, which would provide for an ultimate annual expenditure per state of from \$10,000 to \$20,000 plus an equal amount by the state. In populous states this amount is proportionately increased.

It is squarely up to the existing State Forestry Departments, and state agricultural experiment stations to take the initiative in securing these state and federal funds and placing upon a firm basis the entire movement for better and more efficient management of the farmer's woodlot.

Canadian Department

BY ELLWOOD WILSON

There was never a time when the sentiment for adequate protection of the forests from fire was so strong in Canada as at present. The hand writing has begun to appear on the wall and it would be well if those in charge of and responsible for the protection of this country's great forest wealth would realize that this is no political question that can be dallied with and used as a means of getting votes, but must be squarely and fearlessly faced. The forests are the heritage of the people and they will not see them destroyed. They know where the responsibility lies and will demand a strict accounting. Those Provinces which are drawing the bulk of their revenue from their forests and doling out a mere pittance for fire protection or are using the positions of fire rangers for patronage had better begin to wake up.

This is a question which stockholders of lumber companies, pulp and paper companies, and all other wood working industries should look into. Are their dividends being paid out of their forest capital? Are their woodlands, the base on which all such companies stand, being exploited to provide cheap raw material for a few years or are they being properly handled and conserved for a continuous supply. Bondholders demand that all buildings and plants shall be kept insured. Do they take care to see that the timber holdings of issuing companies are properly protected against fire? If not they are poor security. Banks should not accept as collateral for loans timber limits which are not properly protected and this means that only those in British Columbia, New Brunswick and Quebec and in the latter Province only those patrolled by the Co-operative Fire Protective Association.

On the 2nd of December a meeting of the St. Maurice Forest Protective Association was held in Three Rivers to discuss amendments necessary to make the fire laws of Quebec effective. There were present at this meeting the presidents or managers of most of the Member Companies, and the weak points in the present law were thoroughly discussed and means to strengthen them carefully worked out. The greatest difficulty in the law now is that only a maximum fine of fifty dollars, at the discretion of the magistrate, is provided for all infractions of the fire code, with the result that flagrant offenders are let off with a fine of one dollar. A case in point is that of a man who confessed that he set fire to the forest deliberately in order to obtain work in putting it out and the magistrate fined him five dollars and costs, amounting to about fifteen dollars.

The county magistrates regard infractions of the fire laws so lightly that there should be no option at all in regard to the fine, which should be fixed by the statute and imposed on every guilty person. It was especially recommended that no one should be allowed to set a fire for clearing purposes, at any time between the first of April and the fifteenth of November without a permit from a fire ranger or other Government official duly authorized to issue them. This would in no way affect the liberty of the farmer or put him to any inconvenience, but would mean that the ranger would be responsible and would have to see that the burning took place at a safe time and in a manner to prevent the fire from spreading. There is at present no way in which a fire ranger can get help except by paying whatever a man chooses to ask, and it was suggested that every able-bodied man must help fight fire when called on, by a duly authorized ranger and for a reasonable daily wage, under penalty of a fine. At present no distinction is made by the code between accidental and deliberate setting of fires and the meeting felt that this was unjust and that in cases where it was proved that a man set a fire on purpose the penalty should be a jail sentence without the option of a fine. It is ridiculous that a man who sets fire to a small shed should be guilty of a serious crime while he who sets fire to a tract of forest, worth thousands of dollars, is only guilty of a misdemeanor punishable by a fine of up to fifty dollars. It was felt that this whole question of amendments to the law should be carefully considered by all those at interest and it was decided to issue invitations to all those interested to meet at the Hotel Windsor, Montreal, on the fifteenth of December to discuss the whole matter thoroughly and to decide on the best way to present the matter to the Government.

On the 3rd of December the Dominion Forests Products Laboratory at McGill University in Montreal was formally opened by the Minister of the Interior before a distinguished gathering. An inspection of the timber testing machines, paper mill plant, museum and laboratories was made, the whole declared formally open and then lunch was served at the Mount Royal Club at which the speakers were the Hon. Minister of the Interior, Chancellor Sir William Peterson of McGill University, the Hon. Sydney Fisher, ex-Minister of Agriculture; the President of the Society of Chemical Industry, Dean Baker of the New York State College of Forestry, and Mr. R. H. Campbell, Director of the Dominion Forestry Branch. This

very important undertaking of the Dominion Government will do much to aid closer utilization and the elimination of waste in the wood using industries and already they are looking to it for information and help. The installation is very complete and modern and reflects great credit on Mr. R. H. Campbell and Dr. Bates. The experimental paper mill is very complete with beaters, paper machine and all the necessary accessories, there is a complete plant for testing structural timbers, chemical laboratories, preserving plant, pathological and microscopical laboratories and drafting and photographic rooms. The laboratories have been informally in operation for nearly a year and much valuable work accomplished.

Thirty-five per cent of the professional foresters of Canada have already enlisted, a better showing than that of any other profession.

The Canadian Forestry Association, Commission of Conservation, Canadian Timbermen's Association and the Canadian Society of Forest Engineers, will all hold their meetings in Ottawa, January 17th, 18th and 19th, and there will be a joint banquet on one of these evenings.

The New Brunswick Government will decide in a very short time on a man who will fill the position of Provincial Forester. It is likely that a New Brunswick man will be chosen and the work of inventorying New Brunswick's forest resources will be begun at once.

In the development of the new hydro electric plant of the Laurentide Co. some ten miles of shore line have had to be cleared off and the debris disposed of, and advantage is being taken of this to experiment in brush burning and it is hoped some valuable information will be obtained. All wood cut is sorted carefully so as to get the greatest value from it, spruce, fir and poplar is being used for pulp wood, hemlock for ties, cedar for telephone and fence posts, hard woods for saw timber and fire wood.

British Columbia Notes

The heavy orders for lumber for the United Kingdom placed through the Provincial Government during the past summer as a result of the visit of Lumber Commissioner MacMillan to Europe show what results can be obtained by Governmental action in assisting the lumbering industry. In order to follow up the advantage already gained in this new line of work the Hon. W. R. Ross announced that the Provincial Government is sending a business representative of the industry to London.

Investigation has already shown that before the European market can be entered, on any scale, by our manufacturers a great deal of preliminary work must be done in

The New American Forestry

explaining to buyers the qualities and methods of manufacture of our British Columbia woods. There are many misconceptions which are very prevalent and which act as a barrier to the introduction of our lumber products. These can only be overcome by energetic personal work among the buyers by a representative thoroughly conversant with every phase of our lumbering industry.

Mr. J. G. Woods, the well-known lumberman, has been appointed as the new Lumber Commissioner to the United Kingdom. Mr. Woods has been long and intimately connected with the lumber business of the Coast. After being Manager of the Leamy and Kyle Company, one of the first mills established at Vancouver, he became Manager of the Moodyville Sawmills, and was for many years engaged in the cargo export trade, an experience which is of particular value in view of his present mission. Mr. Woods was subsequently owner and manager of the firm of Woods and Spicer, shingle manufacturers. He thus brings to his task a thoroughly practical knowledge of all branches of the industry whose interests he will further in the European market. The new Commissioner's duties also include the carrying out of various arrangements made with the British authorities in connection with the lumber orders placed through the Department.

Book Reviews

Under the Red Cross Flag. By Miss Mabel T. Boardman. 330 pp., illustrated, price \$1.50. J. B. Lippincott Company, Philadelphia.

Miss Boardman's book is introduced in a brief foreword by President Wilson, who, in his capacity of president of the American Red Cross, places the stamp of his authority upon Miss Boardman's narrative.

From 1881, when the society was created, to 1905, when by act of Congress it was reincorporated, the society had neither membership nor organization. Since 1905 the American Red Cross Society had extended its usefulness over many important fields of relief, and generally improved its efficiency by more systematic methods.

Miss Boardman, after a retrospective chapter on the modes of caring for the wounded in ancient times, which brings the résumé down to the days of Florence Nightingale, opens her story with the treaty of Geneva. She regards as the precursor of the Red Cross the American Sanitary Commission, which instituted preventive measures. She discusses the service of women in war and recites the disasters of the American Red Cross' early efforts. A glance is given to the relief methods of other nations, and a tribute is paid to the "miraculous" work of Doctor Strong in Serbia and his victory over typhus fever.

What some of our members think of the improvement in the Association's Magazine

"Copy of the September issue of AMERICAN FORESTRY has reached us, and we wish to compliment you on the attractive and interesting magazine that you are now getting out."

THE SOUTHERN LUMBERMAN,
Nashville, Tennessee.

"I note with pleasure the great improvement in the AMERICAN FORESTRY magazine. At last there is coming a magazine that will tell the man who wants to know and not only the man that already knows all about the great subject that soon must be learned of by all. . . . Your Bird Department is also one that is exceedingly interesting. I would not now be without your magazine. In fact, you now have a conservation magazine that it will be a pleasure to recommend to the members of our Association."

OLON L. PARKES, *Executive Secy.,*
Berks County Conservation Assn.,
Lyon Station, Pa.

"I think the new style of AMERICAN FORESTRY very attractive and the reading matter splendid."

J. R. GUYER,
York, Pa.

"I want to add my congratulations to those of the many other readers of AMERICAN FORESTRY in the change made in the size and quality of your magazine. I have been a subscriber to this magazine for a number of years and this is my first opportunity to look over the last two or three editions. You surely have made AMERICAN FORESTRY a valuable and attractive magazine and you certainly deserve the hearty thanks of all true lovers of forestry."

F. J. ANGIER, *Sec.-Treas.,*
American Wood Preservers' Assn.,
Baltimore, Md.

"The new dress is fine, but I was satisfied with the old one, which had dignity and character in the make-up and was moreover of convenient form and size; yet the new form indicates a larger vision and so a larger field of usefulness and I wish you god-speed in your greater work for nature and the nation."

WILLIAM RUTHERFORD SAVAGE,
Blowing Rock, N. C.

"The larger style magazine is a dandy and I wouldn't be without it."

GEORGE B. HARTMAN,
Edyville, Iowa.

"The enlarged and improved AMERICAN FORESTRY has reached me and is a 'hummer'."

CLARENCE B. TREAT,
New York City.

"The new form of the magazine is a fine improvement."

EMANUEL FRITZ,
Missoula, Montana.

"The new magazine is wonderful—simply splendid, and every number is an added source of pride to me as a member of the Association. You are surely going ahead by leaps and bounds. It should have a large sale outside of the regular membership of the Association, for it deals so ably with a subject in which so many are interested."

C. L. LARZELERE,
Los Angeles, California.

"The new AMERICAN FORESTRY marks a great step in advance, and I wish to congratulate you upon the steady progress you have been making with this magazine, both from the standpoint of beauty as well as in character. You are to be congratulated on the ability you have shown in constantly improving what has always been a very excellent magazine."

JOSEPH N. TEAL, *Chairman,*
Oregon Conservation Commission,
Portland, Oregon.

"The new magazine is very beautiful indeed and we are sure that you will not regret having changed the style."

BOLLING ARTHUR JOHNSON, *Editor,*
Lumber World Review, Chicago, Ill.

"Permit me to congratulate you on the greatly improved appearance of AMERICAN FORESTRY. I have always derived a great deal of pleasure from the publication, and as a member of the Association am proud of its increased value and beauty. The change should tend to increase interest, not only in the magazine and the Association, but also in the general subject of forestry."

GEORGE S. HUMPHREY,
New York City.

"I have just returned from a summer spent in the West and have been glancing over (more thorough reading later) AMERICAN FORESTRY for August and September. The typography, illustrations, and general 'make-up' as to reading matter, advertisements, etc., leave little to be desired. All this is excellent and I wish to congratulate you most cordially."

WILLIAM R. LAZENBY,
Columbus, Ohio.

"I think your magazine in the new form shows a great improvement. It is much more attractive in appearance, and I find that the articles interest me much more than formerly."

O. T. SWAN, *Secretary,*
Northern Hemlock and Hardwood
Mfrs. Assn., Oshkosh, Wisconsin.

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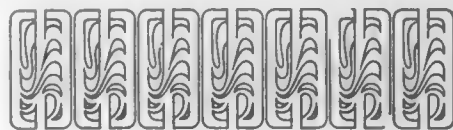
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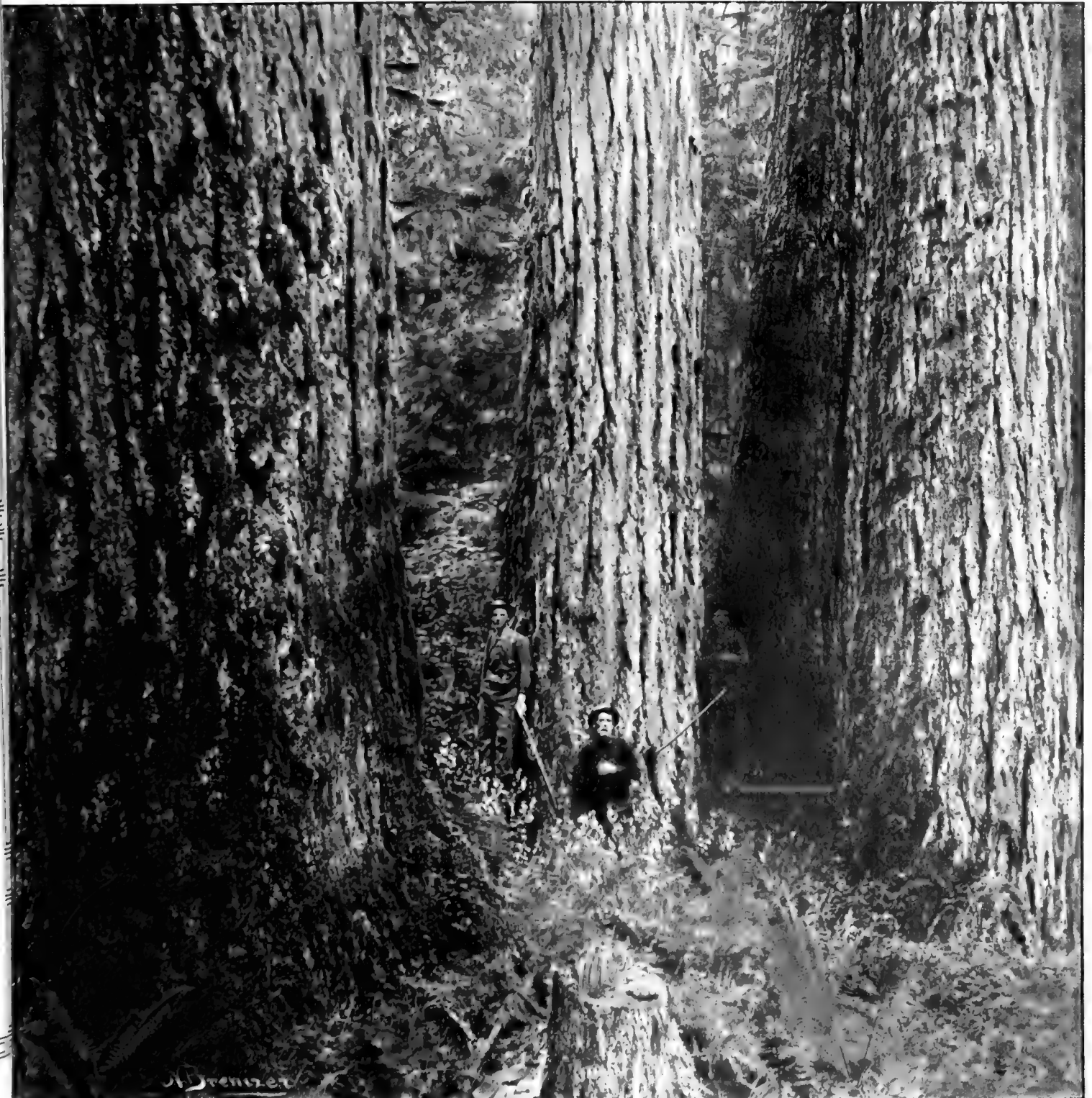
KANSAS CITY, MO.

American Forestry

Vol. 22

FEBRUARY, 1916

No. 266



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Declaration of Principles and Policy of The American Forestry Association

IT IS A VOLUNTARY organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.

IT IS INDEPENDENT, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.

IT ASSERTS THAT forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.

IT DECLARES THAT FORESTRY is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars' worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.

IT RECOGNIZES THAT forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.

IT WILL DEVOTE its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies

National and State Forests under Federal and State Ownership, administration and management respectively; adequate appropriations for their care and management; Federal cooperation with the States, especially in forest fire protection.

State Activity by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners, non-political departmentally independent forest organization, with liberal appropriations for these purposes.

Forest Fire Protection by Federal, State and fire protective agencies, and its encouragement and extension, individually and by cooperation; without adequate fire protection all other measures for forest crop production will fail.

Forest Planting by Federal and State governments and long-lived corporations and acquirement of waste lands for this purpose; and also planting by private owners, where profitable, and encouragement of natural regeneration.

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Classification by experts of lands best suited for farming and those best suited for forestry; and liberal national and State appropriations for this work.

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The Magazine of the American Forestry Association

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February, 1916. Vol. 22

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VOL. XXII

FEBRUARY, 1916

No. 266

Douglas Fir

Identification and Characteristics

BY SAMUEL B. DETWILER

DOUGLAS fir is a true westerner. It is widely traveled, adapts itself easily to varying situations, thrives under favorable conditions, and is brave and persevering in the face of adverse circumstances. It grows throughout the Pacific Coast region and the Rocky Mountains from British Columbia to northwestern Texas, Mexico and the mountains of California. Its range extends over 2,000 miles from north to south and nearly 1,000 miles from east to west. No other important American timber tree is more widely distributed or grows under a greater range of climatic conditions.

Lumbermen and foresters know this tree under its accepted name of Douglas fir, but it is also well known as Red fir, Yellow pine, Oregon pine and Douglas spruce. Superficially, Douglas fir resembles hemlocks, spruces and balsam firs, but it has no near relationship with the pines, although the wood is slightly resinous and pine-like.

Except the giant redwood, no other tree of our continent attains larger size. The tallest Douglas fir on record has a height of 380 feet. Trees 15 feet in diameter have been found, and single trees have been cut that scaled 60,000 feet, board measure. In the moist climate of British Columbia, Washington and Oregon, it commonly grows from four to six feet in diameter and 180 to 250 feet in height. The lowland form of the Pacific Coast is much unlike the Douglas fir found in the high altitudes of the Rocky Mountains. The difference is so marked that some authorities consider that the two forms are separate species. In the drier mountainous regions it is much smaller, usually

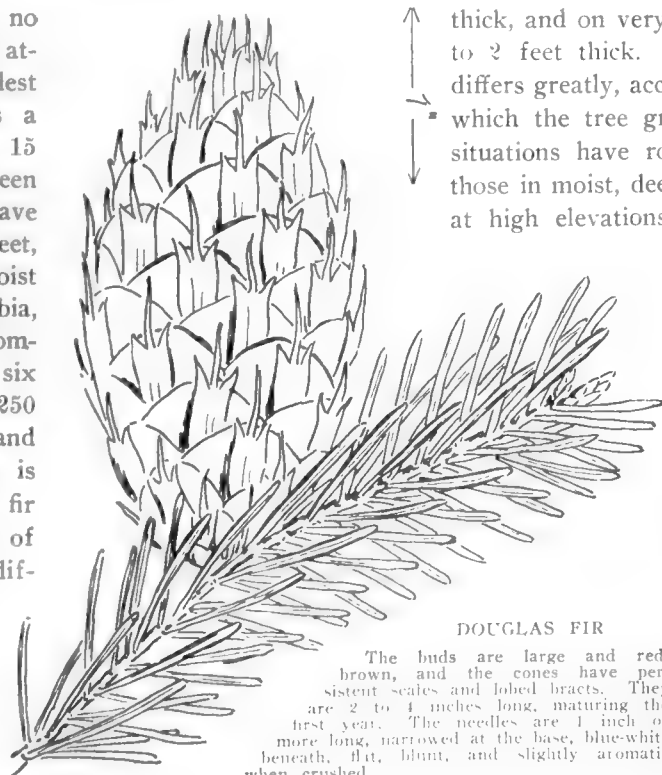
not to exceed 1½ to 2½ feet in diameter, and 75 to 100 feet in height. In very exposed situations it becomes stunted and dwarfed, sometimes growing only a few feet high.

In early life the lower branches usually droop with a slight curve, while the middle and upper ones have an upward trend. This gives the tree a steeple-like effect. In dense forests, the branches are killed on the lower half or two thirds of the trunk. In old age, the Pacific Coast trees are clear of branches for 80 to 100 feet; the trunks taper but little and the tops are rounded or flattened.

The bark of young trees is thin, smooth, ash-brown and with resin blisters, like true firs. On old trees the bark is dark brown outside and clear red brown when cut into. It is deeply furrowed and has heavy irregular ridges connected at intervals by narrow cross ridges.

Near the base the bark may be 5 to 10 inches thick, and on very large old trees it may be 1½ to 2 feet thick. The appearance of the bark differs greatly, according to the conditions under which the tree grows. Trees in dry, exposed situations have rougher and harder bark than those in moist, deep forests. In dry atmosphere at high elevations the bark is often soft and corky and of a gray-brown color.

The leaves are soft and flat, one to one and one-half inches long, blunt at the point. They have tiny but distinct stems which permit them to arrange themselves, feather-like, on opposite sides of the branches, but in reality they are spaced all the way around the branch, and the successive leaves form spirals. In color the mature foliage is usually a deep yellowish green, al-



DOUGLAS FIR
The buds are large and red-brown, and the cones have persistent scales and lobed bracts. They are 2 to 4 inches long, maturing the first year. The needles are 1 inch or more long, narrowed at the base, blue-white beneath, flat, blunt, and slightly aromatic when crushed.



DOUGLAS FIR BARK

On old trees the bark is dark brown outside and clear red-brown when cut into. It is deeply furrowed, and has heavy, irregular ridges. Near the base the bark may be from five to ten inches thick, and on very old trees as much as two feet thick.

though in the Rocky Mountains it may assume a blue-green shade. The leaves remain on the trees from 5 to 8 years, and sometimes 11 years, before they fall.

It makes the finest appearance in the months of June and July. The rich brown buds with which its sprays are tipped swell and break about this time, revealing the young leaves, which at first are bright yellow, making the tree appear as if covered with gay blossoms; while the pendulous bracted cones with their shell-like scales are a constant adornment.

The young trees are mostly gathered into beautiful family groups, each sapling exquisitely symmetrical. The primary branches are whorled regularly around an axis, generally in fives, while each is draped with long, feathery sprays, that descend in curves as free and as finely drawn as those of falling water.

The buds of Douglas fir enable the observer to tell this tree from all other evergreens except the closely related big-cone spruce. They are sharp pointed and conical, with bright red-brown scales. The buds at the ends of the twigs are about one-fourth inch long and twice the size of the buds on the sides of the branches.

The flowers are small, scaly bodies, appearing in the early spring. The orange-red pollen-producing flowers are scattered along the branches at the bases of the leaves. The seed-producing flowers are reddish or rose-colored, growing near the tips of the twigs. Usually they are located in another part of the tree from the pollen-

producing flowers. The latter fall from the tree after the pollen is shed. The seed-producing flowers develop into cones that droop gracefully from the branches. The cones vary from one and a half to four and a half inches in length and are composed of interlapping scales. Each of the six or seven central scales bears two small, triangular winged seeds.

Douglas fir is easily distinguished from all other native cone-bearing trees by the feathered appearance of the cones. This peculiar feature is due to flexible, trident-shaped bracts that extend conspicuously about one-half inch beyond the cone scales. The nearest relative of Douglas fir, the big-cone spruce, has larger cones and the bracts do not extend much beyond the scales. The Pacific Coast form of Douglas fir has a longer and more cylindrical cone than the mountain form, and the feathering is less noticeable because the bracts lie close to the scales instead of protruding at a wide angle, as in the mountain form.

Nature has provided Douglas fir with highly effective methods for scattering its seeds; as a result, it takes possession of burned forest areas very rapidly. The bare mineral soil which is exposed after a fire has swept through the forest is especially favorable for the germination of the seeds. Trees may begin to bear cones as early as twelve years of age; very old trees produce little or no seed. Vigorous trees produce a fair crop of cones every year and very large crops every three to five years.

The color of the wood is light red or yellow, with a narrow band of nearly white sapwood. The wood is heavy, hard and strong, but usually is coarse grained and difficult to work. Each year's growth is plainly marked by a band of light-colored wood formed early in the season which grades into a band of dark-colored, flinty summer wood. Owing to the prominence of the rings, the lumber occasionally may be mistaken for yellow pine or larch.

The heartwood of Douglas fir is durable in contact with the soil. A fallen fir log in a Washington forest was found to be perfectly sound two inches beneath the surface, although a cedar tree 78 years old was growing on it. It is one of the woods extensively used for creosoting for structural and bridge timbers and railroad ties.

Douglas fir grows under many different conditions of soil and climate. For rapid growth it requires deep, well-drained loam soils and abundant rainfall. It grows from sea level where the rainfall exceeds 100 inches to nearly 11,000 feet altitude and 15 inches of precipitation, in the southern part of its range. It develops a wide-spreading and deep root system in deep loam soils. On poorly drained land and shallow soils the root system is flat and spreading, while on rocky or sandy soils more or less of a tap-root is developed.

The scientific name for Douglas fir means "false hemlock." It does not partake closely of the character of the hemlocks, which are noted as being our most shade-enduring species; Douglas fir will live under moderate shade, but will not thrive in dense shade. Its requirements in this respect vary with soil and moisture condi-

tions. In western Washington, Oregon and British Columbia large areas of young growth, composed almost entirely of Douglas fir, are common. The peculiar ability of this tree to reproduce itself is illustrated by counts of over 30,000 eleven-year-old trees, about three feet high, on a single acre. In the virgin forest where Douglas fir is the principal species, the acre yield usually runs from 2,000 to 8,000 feet B. M. in the mountains, and from 35,000 to 60,000 board feet near the Coast. Occasionally acres are found in the Coast region, where the yield is over 100,000 feet B. M., one instance being recorded of 500,000 feet B. M. per acre. The time required to grow trees in a forest of this character has been conservatively estimated at upward of 400 years; more than 700 annual rings have been counted on a single Douglas fir stump.

Forest fires cause the greatest damage to Douglas fir forests; this damage comprises not only the direct destruction of the trees but also indirect damage by causing unfavorable soil conditions and burning fire scars at the bases of the trees through which insects and fungi may enter. The principal insect enemy of the tree is a beetle which bores between the bark and the wood, frequently causing the death of the tree.

Douglas fir derives its name from David Douglas, a Scotch botanist who obtained seed in the State of Washington and planted it in England in 1827. It grows more rapidly than any of the native evergreen trees of Europe and has been widely used in European plantations. The Pacific Coast form is principally planted in Europe; in the Eastern United States the Pacific Coast form does

not thrive, and the Rocky Mountain form should be planted. Douglas fir is a valuable ornamental tree of graceful proportions, good color, rapid growth, and excep-



AREA OF DOUGLAS FIR

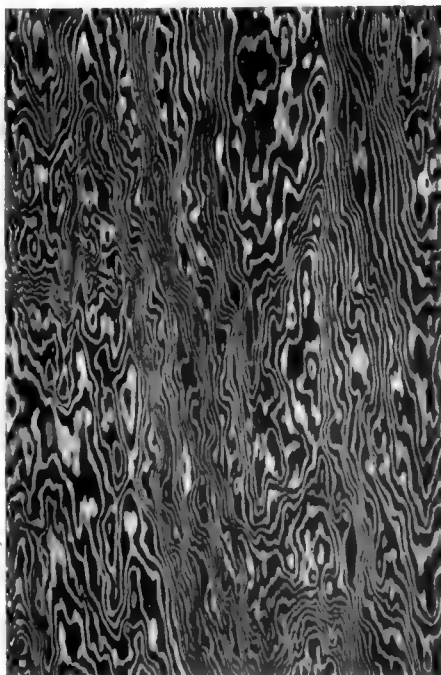
tional hardiness. It has been planted to a considerable extent in the Northern Prairie regions for wind breaks and shelter belts. Because of its exceptional commercial value and the ease with which it is managed in forest plantations, Douglas fir is likely to become one of our most important evergreen trees. More than one-half of the timber at present standing in western Washington and Oregon and southwestern British Columbia is Douglas fir. Lumber of this species can be transported cheaply through the Panama Canal to the markets of the Atlantic Coast, and the public is already becoming acquainted with this interesting wood.

Commercial Uses of Douglas Fir

By J. S. WILLIAMS

SEVERAL hundred years before Columbus discovered that there was another world, there fell on the warm, moist, western slope of the Cascade Mountain Range in Oregon and Washington seeds of the Douglas fir. These seeds, finding conditions favorable to their growth, germinated and grew, and have continued growing even to the present day, though now their height is measured in hundreds of feet and their diameters twelve, thirteen, fourteen, and some few of even a greater number of feet. While the average tree in mature stands of Douglas fir will not, of course, average these great diameters, yet trees of this size are not at all uncommon in that region.

The first explorers to the northwest region, upon returning to their



ROTARY CUT DOUGLAS FIR VENEER

native habitations, told principally of the thick stands of timber and the great size of the individual trees that they found there. Several generations later, as settlements grew up in that region and as ships seeking their cargoes drifted to those parts, they carried away with them long, straight spars to be used for masts in the construction of other ships. And so it has happened that Douglas fir has been best known to the world because of its gigantic size. But it is quite fitting that its uses and qualities be told, as well as its romance.

TRADE NAMES

In the lumber markets of the world Douglas fir is known also, to a greater or lesser degree, by the following trade names: Oregon



Copyright photograph by Darius Kinsey.

A VIEW IN THE WOODS SHOWING THE LOADING OF A DOUGLAS FIR LOG ON CARS

The mammoth size of Douglas fir necessitates powerful machinery for harvesting the logs. This exceptional picture shows the "yarding in" of the log from the woods, the loading of the logs on railway cars, and a virgin stand of Douglas fir in the background. The logs are drawn in a distance of approximately 1,000 feet from either side of the track.

pine, red fir, yellow fir, Puget Sound pine, and Douglas spruce. In foreign countries, especially those of the Orient and the United Kingdom, it is best known, perhaps, as Oregon pine. The names red fir and yellow fir originate from the characteristic color of the wood when grown under certain conditions of soil and in certain localities. There are other trade names of very sectional use, but these are little used today. Again, this species has been confused as to name with certain inferior species, but today the name in most common use and its proper name is Douglas fir.

SUPPLY AND CUT

The rather general belief that the timber supply of this country will soon be exhausted is seen to be of poor foundation when one is apprised of the fact that at the present rate of cutting there is enough of this wood in the Pacific Northwest to last approximately another 150 years, and as Douglas fir can be grown to commercial size in from fifty to seventy-five years under the climatic and soil conditions there found, it is quite manifest

that the ninth and tenth generations from now will still be enjoying a bounteous supply of this excellent wood.

The normal, annual cut of Douglas fir is approximately five and one-half billion. This production is represented principally by Oregon and Washington mills, though California, Idaho, and Montana collectively contribute two hundred million feet of this total. British Columbia, too, is a very large producer of Douglas fir, and has extensive areas of this timber; but its production is not considered in the foregoing figures.

GROWTH AND SIZE

Douglas fir reaches its maximum growth and size and is found in heaviest stands on the western slope of the Cascade Mountain Range in Oregon, Washington, and British Columbia, where the mild winters and generous rainfall contribute ideal growing conditions.

It is found generally admixed with western hemlock, western red cedar, and in some localities with western spruce. Rarely is it found in pure stands, and when so found the areas are quite limited.

Some species, as an example, redwood, are characterized by the immense size of individual trees, but Douglas fir is marked also because of the large average size of the trees and the density of tree growth per unit area. Ofttimes one can find the trees growing so closely together that a considerable distance can be traversed through which one is able to have his hand placed on a tree for every step of the way.

PROPERTIES OF THE WOOD

United States Forest Service Bulletin 108 shows that Douglas fir is the strongest wood for its weight of any wood found in the United States, and that it ranks near the top in strength value among all woods. This bulletin shows it to have an average breaking strength of 6,605 pounds per square inch in green stringers and 7,142 pounds in air-seasoned ones. Its green weight is 3,300 pounds per 1,000 feet board measure. Its great strength, combined with its lightness, makes it an ideal structural wood. Its practically inexhaustible supply, the decreasing areas of other good structural woods and their comparatively small supply, mean that Douglas fir will, before many decades, become the most common and most used of all our American woods.

Because of the immense size of the timber, a Douglas fir log will produce a very high percentage of perfect timber, free from knots and other defects common to species of smaller growth.

Douglas fir offers a marked contrast between its spring and summer rings of growth. This characteristic gives the wood an extraordinarily pleasing grain, or figure, when cut at certain angles to the log. The greatly admired beauty of hardwoods, especially the oak in its quartered faces, is obtained by cutting the boards parallel with the radial planes of the log. This is due to exposing the greatest possible area of the medullary



THE TWO VETERANS

The butt end of a Douglas fir log some thirteen feet in diameter and one of the old lumbermen who has spent most of his life in the Pacific Coast lumber industry.

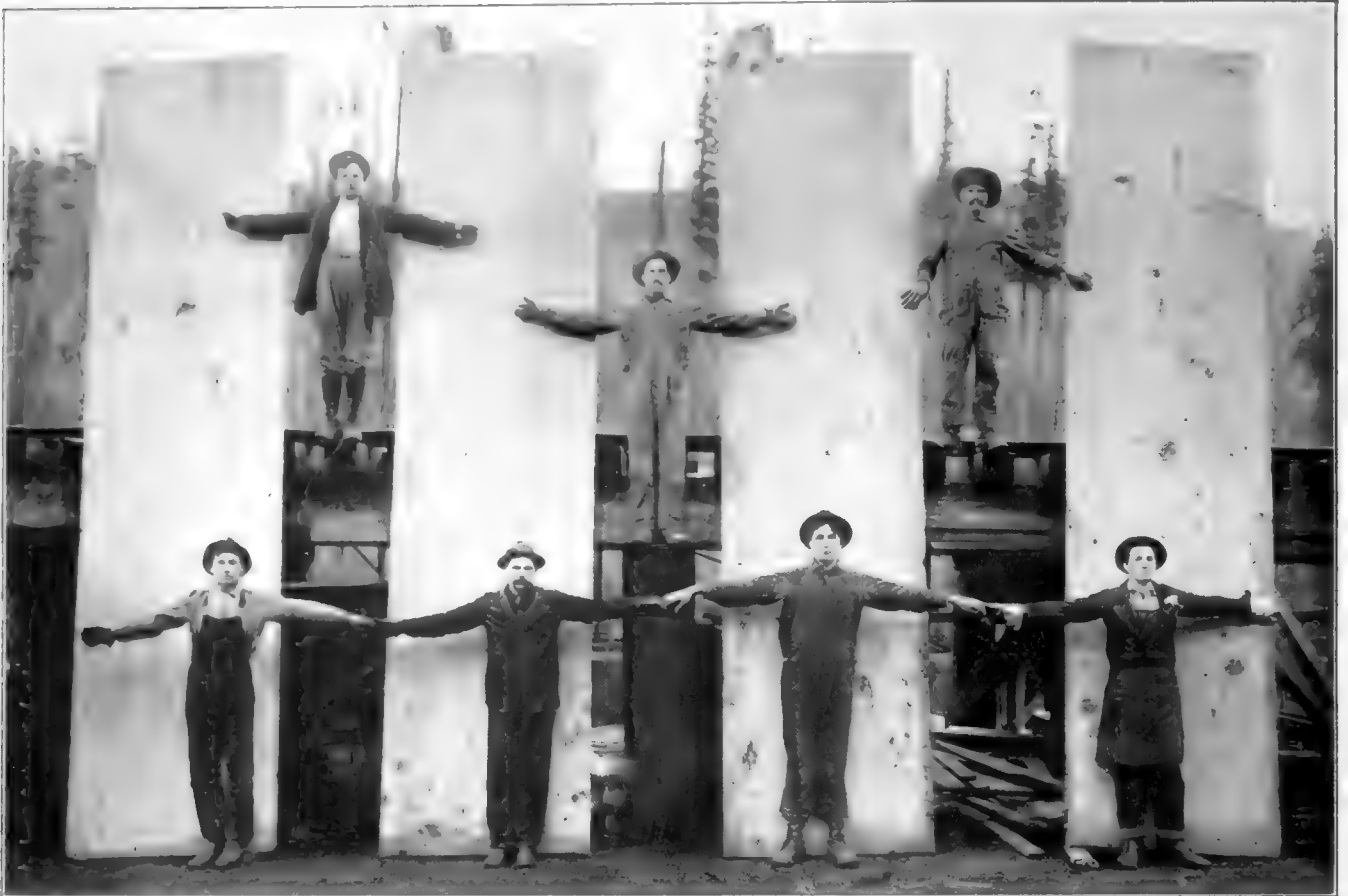


A LARGE AIR-DRYING YARD OF DOUGLAS FIR

Air drying reduces the amount of moisture and simultaneously increases the strength. The large mill in the background cuts over 400,000 feet of lumber every working day. This particular sawmill is said to be "the last word" in efficiency.

rays. Douglas fir, as all conifers, has very small medullary rays, so one must not look to this characteristic for its beauty. To obtain the most pleasing grain in this wood, the rings of growth must be cut across at a very small angle. This is done by rotating the log after a softening bath in steam against a sharp knife, and a thin section of the wood is laid out on a table in one immense sheet. In rotating the log against the knife the rings of growth are cut across nearly parallel, thus exposing large, irregular areas of the hard and soft, or dark and light, rings, creating myriads of irregular designs. One with a fair imagination can make out contours of almost any object he might desire.

In point of durability Douglas fir ranks well, and when used in construction intelligently, enabling sufficient and proper ventilation, will last several generations.



Copyright photograph by Darius Kinsey.

THIS SPEAKS FOR ITSELF

This picture shows the great width of clear lumber that can be obtained from Douglas fir timber. Douglas fir produces a very high percentage of absolutely clear lumber.

Douglas fir is one of the very few woods which is well adapted to construction throughout, either in the home or commercial structure. For use as sub-sills, joists, studding, and rafters it has strength and durability; for use as siding it has beauty and durability and holds paint well; as a flooring material it offers great resistance to wear, and for the interior finish of the home, the paneling, baseboards, stairwork, doors, sash, moldings, or other finish requirements its beauty adapts it admirably.

But while filling well the needs of a home-building wood, it is none the less a factory, store, bridge, and general structure wood. Its strength, lightness, and durability are the desired characteristics for these purposes. Railroads are large purchasers of Douglas fir for car construction, railroad ties, trestle work, piling, poles, and miscellaneous work. In 1909, when approximately one hundred and twenty-five million ties were purchased, Douglas fir contributed over nine million of them, and would furnish many more but for the long haul to the principal tie markets. Southern pine furnished twenty-one million and the oaks fifty-seven million.

The same year twenty-five thousand poles were cut from Douglas fir. The cedars, however, are preferred for this use because of their extreme durability.

No data are available on the amount of piling driven annually, but Douglas fir is exceeded only by the Southern

pinus as a piling wood. The four requisites of a good piling are straightness, strength, length, and durability. Douglas fir is nearly always "pencil" straight, amply strong, clear length up to one hundred and fifty feet, if desired, and is the equal in durability of other woods used for this purpose. Creosoting greatly lengthens the life of piling, and a marked increase in the number of creosoted Douglas fir piles is noted annually. The creosote acts as a poison to the great enemy of piling, the toredo, and, in addition, preserves the wood.

WOOD BLOCK PAVEMENTS

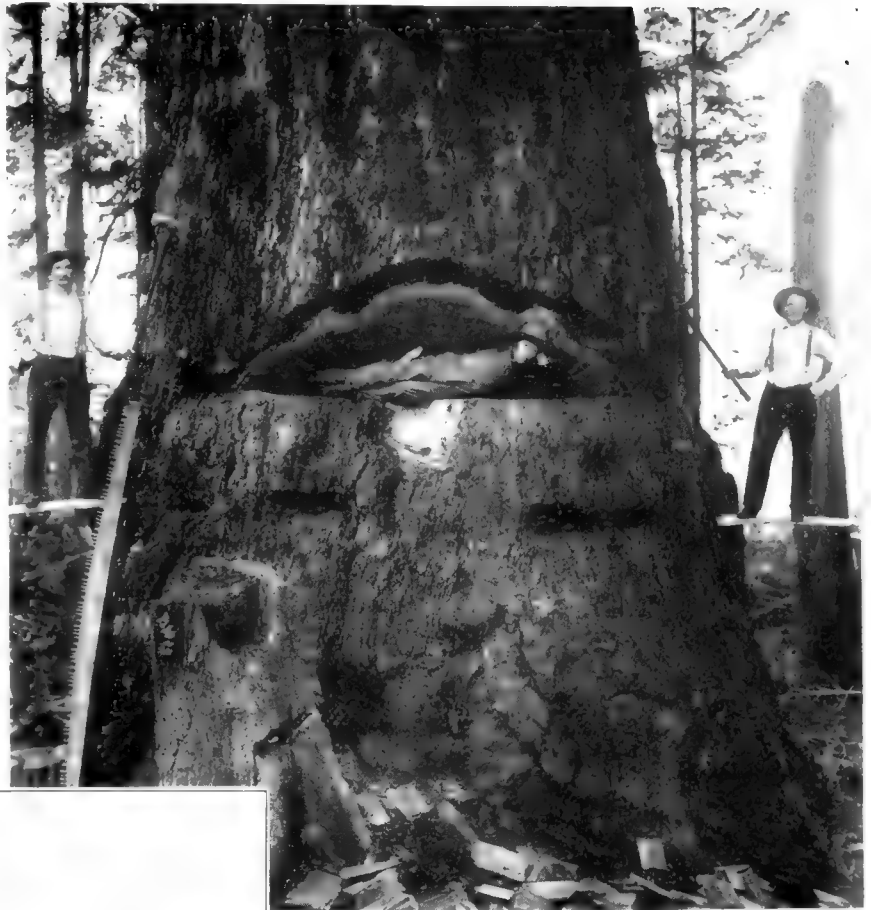
In trend with the modern tendency toward increased efficiency may well be mentioned the use of creosoted wood blocks in pavement construction as a distinct improvement over the commonly used materials. Silence to traffic, longer life, more even wearing surface, better service, small maintenance cost, ease of repair, quickly laid, and sanitary are terms which describe the Douglas fir wood block pavement. Several examinations have been made recently of this type of paving where the blocks had been down for from eight to fifteen years, and none of these showed more than one-quarter inch wear in all of that time. And they bid fair to last an indefinitely longer period under the same satisfactory

conditions of service. Wood block pavements have reduced the noise of traffic so that property values and rents of buildings abutting streets so paved have increased materially.

Fully fifty per cent of the cross arms used by telephone and telegraph companies are of Douglas fir. In 1909 one and three-quarter million cross arms were manufactured from Douglas fir. These were sold for an average f. o. b. price of 38 cents each, which was slightly above the price paid for other competing species. Lightness and strength are the principal requisites in cross arms.

Douglas fir is now used extensively for boxes and heavier crating purposes, especially where greater strength is required in a box than the softer woods most used possess. Douglas fir veneers are now used in fruit and vegetable basket manufacture.

Lath are manufactured from this wood



Copyright photograph by Darius Kinsey.

FELLING A DOUGLAS FIR TREE

Showing the "undercut" preliminary to felling a Douglas fir giant 17 feet in diameter. This tree contains sufficient lumber to build four modern cottages complete. Trees of this species have been found of even larger diameters.



THE LARGEST WOOD PIPE IN THE WORLD

This pipe is 13 feet 6 inches in diameter. Built of Douglas fir staves. Wood stave pipe has a low initial cost, exceedingly low maintenance cost, a low factor of friction, and will withstand very heavy pressures. As its merits become more widely known its use will no doubt be largely extended.

to the extent of over one-half billion pieces per year, and their value for this purpose runs close to the million-dollar mark.

A field which is fast developing is in the use of wood stave pipe, stave tanks, and stave silos. The requirements of a wood stave for these purposes are strength, close grain (water-tight), durability, and absence of defects. Douglas fir is a favorite wood for this purpose, as attested by the large amount of lumber cut annually into staves for such construction.

Continuous stave pipes, bound together by iron bands, are well adapted for purposes where the internal pressure is quite high, such as found when water is transported under a high head. This style of pipe is extensively used in conducting water for irrigation purposes, hydroelectric projects, and for city water supplies. The Pueblo Rocky Ford Company, in Colorado, carries water four miles from a dam to the head of their irrigation canal by a continuous Douglas fir stave pipe eighty-four inches in diameter. Seattle brings its water supply a distance of forty miles from the Cedar River through two lines of Douglas fir stave pipe. The largest



DOUGLAS FIR FOR INTERIOR DECORATION

This is the reception room of the Pan American Building at Washington, D. C. It is finished in Douglas fir, given by the Oregon and Washington Douglas Fir Dealers' Association. The room was one of the show places in the Pan American Building, which attracted much attention from the delegates during the recent Pan American Scientific Congress.

pipe of wood in the world was made in the same manner to conduct water for hydroelectric purposes a distance of one mile. This pipe is one hundred and sixty-two inches inside diameter, and was erected in the State of Washington not far from Portland, Oregon.

Tanks and silos require big amounts of this wood annually, and almost all mills cutting Douglas fir carry stock known as "silo stock." Douglas fir is peculiarly fitted to use for stave tanks for holding acids. Concerns which have to use a considerable amount of acids in their manufactories prefer Douglas fir for these tanks because of their extreme resistance to oxidation by acids. The wood stave silo has proven to be quite superior, due to its ease of construction, its strength and durability, and low initial cost. It is estimated that a wood stave silo is from twenty to sixty per cent cheaper than silos made from substitute materials, such as cement, brick, tile, etc. The wooden construction can be done by unskilled workmen, saving quite an item in construction expense. Moreover, the wood keeps the temperature of the ensilage more nearly uniform than materials which are good conductors of heat.

FURNITURE

Although being a little too soft for the construction of the finest furniture, yet the furniture business every year consumes several million feet in the manufacture of low-rate-priced furniture. For work tables, shelving, counters, cabinets, cupboards, and like equipment it answers well the requirements, and, in addition to its initial cost, which is well below that of hardwoods that it finds its best use for such purposes.

MISCELLANEOUS USES

In the construction of boats, such as sailing vessels, the smaller-sized steamers, auxiliary-power schooners, and the smaller craft manufactured on the Pacific Coast, Douglas fir is used almost exclusively. It is especially desirable for such construction, because the long, clear timbers required are so easily obtainable.

Many novelties and by-products of the general lumber manufacture are now made from Douglas fir. Since the war makes German toys no longer available, there has been a marked increase in the number of toys manufactured from the western woods, and an interesting feature of this change in source of supply is the change in the character of the toys. The



DOOR OF DOUGLAS FIR

The beauty of the finish makes this wood particularly desirable for interiors and its use for this purpose is steadily increasing.



SOME BOARDS OF DOUGLAS FIR

These are not of an exceptional size, but are samples of the daily run at many of the big mills on the Pacific Coast.

toys which find most ready sale now are those of an educative nature, such as building blocks, toy houses of wood, and other objects which the child can build for himself.

The innumerable uses to which wood is put, which are not classified according to special uses, but which, in the aggregate, require millions of feet annually, are well represented in species by Douglas fir.

GRADES AND PRICES

On December 1, 1915, the following prices were those prevailing for the general classes of lumber manufactured from Douglas fir. The prices listed are f. o. b. the car at the points of manufacture:

Class and Grade.	Size.	Price per M. ft. B.M.
Vertical Flooring, No. 1 Clear.....	1 x 3	\$26.50
No. 1 Clear.....	1 x 4	22.50
No. 2 Clear.....	1 x 3	21.50
No. 2 Clear.....	1 x 4	19.50
Flat grain Flooring, No. 2 Clear and better	1 x 4	13.50
	1 x 6	19.50
Finish, No. 2 Clear and better.....	1 x 6, 6'-16'	23.50
	1 x 12, 6'-16'	26.50
Ceiling, No. 2 Clear and better.....	5/8 x 4, 10'-16'	13.50
Drop Siding, No. 2 Clear and better...	1 x 6	18.00
Silo Staves, No. 2 Clear and better.....	2 x 6, 8'-22'	15.00
Common boards and shiplap, common	1 x 8, 6'-20'	9.50
Dimension, Common	2 x 3, 2 x 4, 12-14'	8.00
	2 x 12, 12-14'	8.50

While Douglas Fir today ranks second in the amount of timber cut annually, being outranked by a combination of the three Southern Pines, longleaf, shortleaf and loblolly,

the almost universal use to which this wood can be put, the practically inexhaustible supply of this timber, the comparatively rapid decrease in the stands of other species, the Panama Canal making possible delivery in eastern United States at reasonable rates, and a better knowledge of the merits of the wood by people generally, undoubtedly will in the future give Douglas fir the just title of "The All-Utility Wood."

IN A WASHINGTON FOREST

BY DONALD A. FRASER

Huge pillar-firs rise round me, straight, serene—
 Brown pillars, mossed and flecked with lichens gray—
 So thick they throng their shadows dim the day
 That filters through the roof of somber green
 In golden shafts, to shatter on the sheen
 Of viney-maple leaves that spread their spray,
 So fairy-like, so flutteringly gay
 Among the grim dark trunks they stand between.
 The yielding floor of twigs and matted spines,
 Dead memories of many a sunny ray—
 Is carpeted with ferns and trailing vines,
 So soft, my foot-fall's silent as I stray.
 Here Peace and Silence in their temple dwell,
 And bows my heart beneath their magic spell.



Photograph by Mark Daniels.

THE GROVE OF CYPRESS TREES FIRST SEEN ALONG THE FAMOUS DRIVE

The Seventeen-Mile Drive is a road, the smoothness of which makes a drive over it seem but a continuation of the ride in the luxurious Southern Pacific coach which brings the tourist to this land of enchantment. It is indeed a blessing that the steel rails stop before they penetrate this forest of cypress.

The Tree of Legend and Romance

BY MARK DANIELS

Former Superintendent of National Parks

THERE is a lone tree in Lombardy that accomplished what a million men suffered and slaved to do. It stood in the path of the great Simplon road, and at the sight of its stately grace Napoleon turned the road from a straight line, that its beauty might remain man's heritage. It is the cypress of Somma, and stands as a monument to the greatness of one man and a lesson to those who would sacrifice beauty to the god of gain. That Napoleons are scarce we know, but are there so few who have not even enough of his vision to see and appreciate the glory of a magnificent forest or the eternal miracle of a waterfall that they will continue to squander these birthrights by indiscriminately hewing down the forests and damming up the streams?

Perhaps this cypress of Somma, if it has not been shot down by another of man's engines of destruction, still stands as the first example of the spirit of conservation. And saved for its beauty alone! Think of it! I hear

the groans of anguish as some millionaire lumberman of Minnesota estimates the amount of board feet of precious lumber that is contained in its 120 feet of towering trunk. Napoleon might have built a nearby bridge with it, thereby saving the cost of hauling; or he might have built a fire in which to heat iron for axes with which to chop down more trees! But he did not, and that fact will redound ever to his credit and to the shame of those who are so ruthlessly stripping our land of its forest cover.

There stands not one cypress, but a grove of them, of surpassing beauty, on our western coast. True, they are not of that tall, stately variety, with formal, architectural lines; they are, on the contrary, the exact or complete reverse, for they are gnarled and twisted; but they are beautiful in their setting as anything that the eyes of man may rest upon. There is but a comparatively small area where they still grow, and they are as distinct among the other conifers of their region as are the Sequoia Gigantea



Photograph by Mark Daniels.

A VISTA ON LOBOS POINT

At every turn of the winding trail a new vista, startling in its exotic character, bewilders the observer, until the sense of location and direction is all but lost. Climbing amongst the trees and rocks on this rugged point is as hazardous as threading the twisting lanes of the old-fashioned maze.

amongst the conifers of the Sierra Nevada. In fact, in many respects they remind one of the "big trees," as they are called; for they have a most distinct individuality which makes them stand out alone. They are to be found only in a certain locality, and their age is much disputed. I have heard the last-named estimated to be from 100 to 7,000 years, and there seems to be no reconciling the various contestants. However, the question of whether they have seen one or twenty generations of time would seem to be of small moment, in the light of the fact that they are struggling through the last few years of one generation of American tourists. But they seem to stand the storm of "Oh's" and "Ah's" with that same fortitude with which they resist the gales and blasts of that beloved seacoast on the very edge of which they spread their spiraled roots. Growing down at the actual verge of the sea, with bare branches stretched out like arms toward the land of the setting sun, the question of whether they are the vanguard of an ancient western growth or

the stragglers of the great eastern forests that were cut off by the Pacific is almost always the first subject of conjecture on the part of the tourist.

About 125 miles down the coast from San Francisco lies the Bay of Monterey, at the southern extremity of which the first cypress trees are to be found. These trees possess more the character of the cedar of Lebanon than they do of any variety of cypress, and are known to those who burden their minds with etymological detail as the *cupressus macrocarpa*. From this point, which is known as the Del Monte Peninsula, and which forms the southern shores of this wonderful sapphire bay, picturesque groves and occasional isolated specimens are dotted along the coast for some twenty-odd miles to Lobos Point. Here, again, the old adage, "It never rains but it pours," is borne out by the riot of exquisite beauty which confronts the observer on every side. Nature seems to have concentrated on this locality in the development of extremes of picturesqueness and intensity of color. The shore line is broken and jagged, with here and there a stretch of ivory-colored sand beach, terminated and broken by precipitous cliffs, against which the indigo sea hurls its pearls and sheets of water that are a pale jade green against the lemon-colored horizon and the setting sun. A motor trip along the coast line gives one the effect of a kaleidoscopic change of coloring, the rapid succession of which should vary with the speed



Photograph by Mark Daniels.

THE VANGUARD OF THE FOREST—A STUDY IN THE HARMONY OF HORIZONTAL LINES

The branches beneath the tops of evergreen are frequently horizontal and almost parallel to the gracefully curved or sloping tops. With the sparkle of the reflected sun and the gold of the horizon line, these branches and vivid green tops form a composition in the harmony of attitudes and a study in purples, greens and golds.



Photograph by Mark Daniels.

THE BONES OF HIS ANCESTORS?

These are some of those fallen monarchs whose age is so much disputed. They are bent and twisted beyond anything that may be seen in the standing trees. This rugged tangle of bonelike branches lies beside the drive and seems to cry out for burial.

of the motor were it not for the unholy combination of the modern six-cylinder machine with the freedom granted the tourist by the owners of the property. As it is, however, conditions would appear to be reversed; for, with the average driver, the speed along these wonderful drives is such that the constant prayer of the tourist is that some accident may happen which will allow him sufficient time to fix upon his retina one permanent picture of the exquisite color harmonies of the sapphire bay, the ivory-colored beach line, the silver-gray trunks of the trees, and the deep blue and bright yellow-green of their tops.

Not only is the district one of exquisite beauty of landscape, but it is pregnant with romance and historical interest. On December 10, 1602, almost twenty years before the Pilgrim Fathers landed at Plymouth Rock, Don Sebastian Visciano landed on the peninsula and took possession of the country in the name of the King of Spain. Many romantic changes took place in the administration of the district until about 1770, when Monterey was selected as the capital of the State of California and Don Gaspar de Portola appointed the first governor. The monuments to this famous character, whose name is interwoven with the history of the State of California, are almost as plentiful in number as are the elms in the State of Massachusetts under which George Washington first took command of the Army of the Potomac. More substantial and authenticated, how-

ever, are the monuments that were left to the memory of Father Junipero Serra, in the form of missions which he erected throughout the State of California and in which he endeavored to civilize the savage tribes. In 1771 this noted priest built the Mission del Rio Carmelo, which still stands as one of the points of interest in this historical district. The death of Father Serra, in 1784, at this mission, where he was buried, marked the beginning of the history of California as we know it.

In 1846 Commodore Sloat landed with 250 men and raised the flag of the United States over the custom-house. The old custom-house still stands, as do the first brick house, first lumber house, and the first theater in California, and within a short walk of the most beautiful bit of coast line and the most picturesque grove of trees that are to be found on this continent. Whether it was the beauty and charm of this place and its romantic history, or whether it was a clairvoyant power that gave him knowledge of future hordes of tourists who might wish to see one of his homes, is not known; but there is, nevertheless, one of the homes in which Robert Louis Stevenson dwelt in the old historic town of Monterey.

There has been a great deal of speculation as to the origin of these trees which take such strange and weird shapes in their struggle for existence against the coastal storms. Their trunks become gnarled and twisted and take on the hue of the surrounding rocks. The dead leaves and branches that lie in a clutter upon the ground

beneath their spreading branches remind one of nothing more than the bones of some prehistoric monster. They are unusually tough and hard, and appear to have been bleached by centuries of weather. The under portions of the live branches are a russet gold in color, and give one the impression of having rusted through the action of the sea's mists. Their twisted branches are silver-gray and bare, and become a tangled mass at the top, the under side of which is black and moss-covered, bringing

is the most lasting of all wood. The ancients engraved their laws upon cypress, which, coupled with the possibility of their having used the same material in the manufacture of clubs, might explain why these laws and the order in which they were drawn to enforce remained intact for so long a time. A statue of Jupiter was carved in cypress and stood without decay for 600 years, which is considerably longer, and is still in a better condition of preservation than the memory of him whose image it is. So there is considerable foundation for the contention that the great age of these dead trees cannot be disproved through the theory that they would have decayed and disintegrated in the length of time they are



Photograph by Mark Daniels.

A GNARLED AND TWISTED PATRIARCH OF THE CYPRESS GROVE

Strangely enough many of the branches of the more wind-swept trees grow straight out in the direction of the prevailing winds. They are bare and as stiff as steel springs, thrusting their sharp points in the teeth of the gale as if to hurl defiance at the elements.

into vivid contrast the brilliant green of the upper surface of the top. It would appear to be a simple matter to count the rings on one of the fallen trees and thereby determine the age, even though these rings are so close and fine as to make the task an extremely difficult one. This has been done in one instance, and the age of the tree before it fell was ascertained to have been 221 years. The disputed question is just how long the dead tree had been down. Some contend that in a few centuries there will be nothing left of the wood, while others vociferously proclaim their firm belief that the tree was deader than Ptolemy's mummy long before the latter lost its hair.

To substantiate the contention that the dead-and-down trees are very aged, it has been pointed out that cypress



Photograph by Mark Daniels.

NEAREST APPROACH TO SLENDER GRACE THAT THESE HARDY TREES ATTAIN

Most of the trees are gnarled and twisted and bent into grotesque shapes. The coastal winds and the spray of the sea bend their tough branches and stain their twigs and foliage with russet gold and purple hues.

supposed to have been down. At a recent visit to this country Lord Balfour, of England, who has given considerable study to cedars and cypress trees, expressed his conviction that one of the dead trees was of the family of the cedar of Lebanon, from which source immediately sprung the belief in some fertile western minds that these trees are the sires of the cedars of Lebanon to be found in the Holy Land. Whether such is the case or not, it should be, in my opinion, a matter of pride to any

self-respecting tree to feel that its ancestry was domiciled on the shores of this glorious bay, and that it had been sired by the most picturesque tree of a continent.

From the hotel at Del Monte a wonderful drive, known as the Seventeen-Mile Drive, follows the coast line past the historic old buildings of Monterey, skirting a mission wall (which should be a standard for modern architects to strive toward) and along the sandy beach past homes of innumerable sea fowl, and plunges into a forest of pines that forms the background to the first grove of cypress trees. From there the road winds in and out amongst the spectral trunks, giving a glimpse here and there of the blue horizon and jagged points of promontories, burying itself now and then in the dark and gloomy shade where the growth is dense. About four miles beyond the first grove of cypress trees is the famous



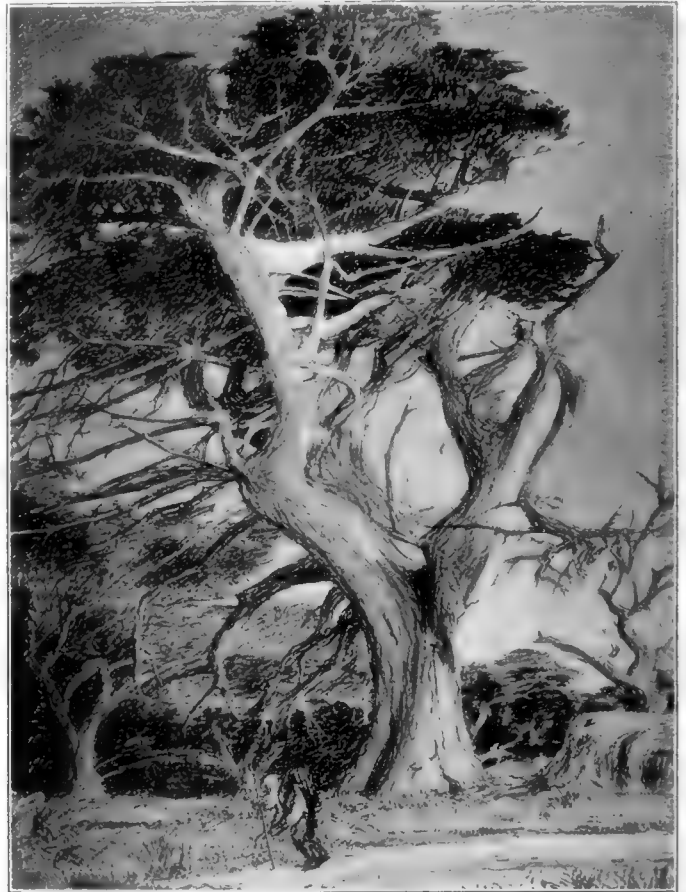
By C. K. Bonestell, Jr.

LITHOGRAPH SKETCH OF OLD CYPRESS

The individuality and character of these trees is such as to defy the art of the camera. Photographers are plentiful in the vicinity, but their work never seems to carry with it the atmosphere that surrounds these sturdy trees. Mr. Bonestell has caught something of the spirit of the district in his sketch.

Midway Point, which, until the advent of a fleeting exposition, was the most photographed tourist lure on the Pacific Coast. It comprises a rock promontory that projects out into the sea, with its toes lapped by the gentle waves of the Pacific, whose ardor has been tempered by the reefs and submerged rocks farther out at sea, upon the treacherous points the coastwise traffic of this district is frequently wrecked. Upon the summit of this promontory is placed there by the playful hand of an

imaginative painter, grows a lone cypress tree, the roots of which are almost entirely exposed to the air. The top of this tree, however, is brilliant green, and when silhouetted against the sky of the setting sun is indeed a sight to behold. Farther along the coast the drive widens along the shores of Pebble Beach, past the homes of men whose millions are in the banks and others whose for-



By C. K. Bonestell, Jr.

LITHOGRAPH SKETCH OF ONE OF THE OLDEST STANDING TREES

The ground about this old monarch is scarred with the imprints of easel legs and artists' stools. Hardly a season passes that some artist of international fame does not plant himself before this picturesque tree to engage in another struggle with the reproduction of the illusive tints and shades of its trunk and branches.

tunes are still in their heads, to Arrowhead Point, and beyond to the famous mission that marks the mouth of the Carmel Valley. Beyond the point where the Carmel River empties into the sea is Lobos Point, and the quaintest and most curious cannery on this coast. At the latter-named point of interest they preserve the toothsome abalone, a sea product that is peculiarly indigenous to this locality. Many strange and weird tales are told of the dangers of persuading the tenacious abalone to relinquish his clutch upon the surface of his beloved rock. The inhabitants of the district will tell of this man and that who, actuated by an unconquerable desire to bring away a souvenir, has unwittingly placed his fingers beneath the edge of the abalone shell, when, without warning, the vicious brute clamped suddenly down upon his fingers and imprisoned him, like Prometheus bound to the rock, there to suffer a lingering death by drowning

with the rising tide. To hear these tales, one might reasonably be led to believe that the abalone, though nothing but a group of muscles encased in a shell, was possessed of the agility of the cat rather than the sluggish movement that is typical of his species. I personally have never been able to reconcile my instinctive incredulity to the tales of drowning fishermen imprisoned by the ferocious abalone, knowing, as I do, that the average tourist whose shoes have been wetted by an unexpected wave is prone to describe his experience as a miraculous escape from a tidal wave of the Pacific. The fact remains, however, that should one unwittingly allow his fingers to remain beneath the edge of an abalone shell long enough to allow the tremendous clamping power to crush down upon them, he would undoubtedly be either imprisoned or lose his fingers. The practice amongst the fishermen who supply the cannery is to carry a long steel bar, with which they pry the abalone from the rocks in a manner that is astonishingly prosaic for a creature the permanent abode of which is so beautiful.

The Carmel Bay, in which the abalones are most plentiful, is the little sister of the Monterey Bay, just to the north, and the bits of kelp which dot its surface, combined with the strange exotic character of the trees and promontories that bound it, lend an aspect to the landscape that suggests tropical scenery of the islands that lie beyond the horizon. With a good cigar, and even an indifferent book, one may spend a happy afternoon in the shade of the cypress, and find at each upward glance with the turning of a page an entirely new setting, with a foreign drop upon the ever-changing stage that confronts his western gaze. At his feet is an inlet that begins with purple and ends with gold. Against the sky is silhouetted the squat and sturdy cypress, every line of which expresses tenacity and endurance. As the setting sun passes over the sky, the shadows shift and change, and the setting changes from the Land of Beyond to the Land of Nod with a suddenness that is startling. "The cliffs take on a purple hue, the sea is green and then is

blue." Truly, Solomon in all his glory was not arrayed like one of these.

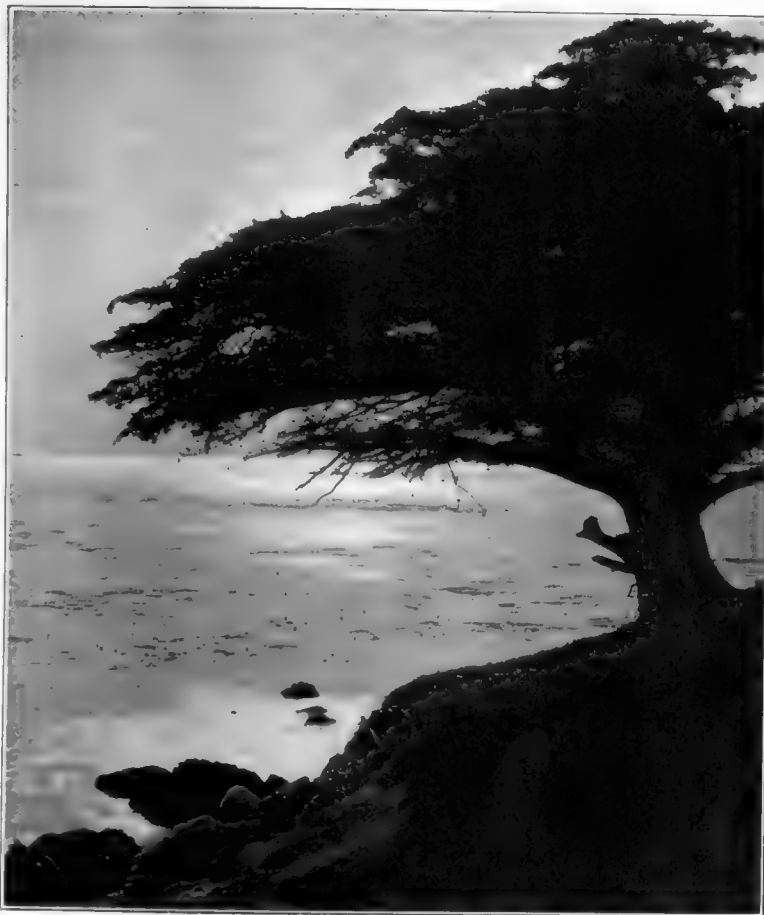
The chauffeur who one day accompanied me said a visitor exclaimed about the roaring breakers that dashed about the cliffs in a vain effort to wash away the scant soil about a cypress that stood out on a headland like a sentinel, "Isn't it just too cute?" I asked him what had been his reply, and he said he had told her he reckoned it was just as cute as the Battle of Ypres, intimating further that, in his opinion, there were times when one

was justified in heaping coals of fire upon another's head, despite any little repugnance for the odor of burning bone. With the booming of the waves in the cannon cave at Lobos Point, where the entrapped surf has no other outlet than to roar over its impotence, reverberating along the coast, it was not difficult to agree with him.

With all the hue and cry for the creation of more national parks, particularly when it is considered that the demand is so frequently strongest where the justification is least, it is strange that this area has not been set aside either as a national or a state park. That it has not is probably due to the fact that the public now enjoy all the freedom of the locality that could reasonably be demanded with the added feature of the certain knowledge that political

change may not interrupt the generous administration of the district's affairs.

Public reservations of the character of our national parks are set aside for the purpose of preserving features of unusual beauty and of historic and scientific interest. Here is an area—the only one that I know—which possesses all three of these characteristics to a marked degree. It is the sole abode of a species of wonderful trees; it is a district of fascinating historical interest, into which are crowded more relics of days gone by than any other equal area in the West, and, above all, it is a veritable gem of exquisite and surpassing beauty. Therefore, despite the fact that it is not in the category of national parks, it is deserving of attention as the Cinderella of our national scenic areas that is just coming into her own.



Photograph by Mark Daniels.

A SENTINEL THAT BOWS TO THE WIND AND THE SETTING SUN

Here and there along this portion of the coast an occasional tree stands out and aloof from its fellows with its roots actually lapped by the waves of the sea. They appear like nothing more than sentinels posted at the edge of the sea to warn the forests behind of the fury of the waves.

The Bird Department

BY A. A. ALLEN, PH.D.

Assistant Professor of Ornithology, Cornell University

THE IMPLEMENTS OF BIRDS

PASSING through the halls of any of our large museums and inspecting the cases in which are arranged the mounted birds from all over the world, one is impressed by the great variety of their form and color. Almost every imaginable combination of colors is found represented in the plumage of some bird,



HEAD OF A RED-TAILED HAWK

A bill such as this is well adapted to a diet of birds and small mammals, and has been copied by the totally unrelated owls and shrikes.

and the many modifications of size and shape are such as to leave one confused by the heterogeneous assemblage. One is almost led to believe that nature has given loose rein to her imagination and allowed her most fantastic dreams to take the form of birds. Yet scientists tell us that there is a reason for everything, that no structure exists unless perfectly adapted to the function which it has to perform. The long legs, slender neck and the great humped bill of the flamingo, we are told, are adapted to its peculiar method of feeding on the minute mollusc life of the tropical mud flats where it lives. The tremendous bills of the South American toucans and African hornbills serve as arms for reaching far out to

the smaller branches for the fruits which form the food for these ungainly creatures. But let us consider the commoner of our North American birds with reference to their food and see if there are similar reasons for their variety of form.

The birds of prey, with their long, hooked bills, sharp talons, and powerful wings fitted for the pursuit of birds and small mammals, are doubtless familiar to everyone. So necessary is this type of bill and foot for a carnivorous diet that two totally unrelated groups of birds, the hawks and the owls, having the same feeding habits, have developed such similar structures that for many years they were classified together as forming the Order Raptores, when, as a matter of fact, the owls are much more closely related to the whip-poor-wills.

One group of the common perching birds, the shrikes, which have taken up a carnivorous diet, have likewise developed hawklike bills, although their feet are still of the ordinary perching type. The buzzards, on the other hand, which have degenerated from the carnivorous diet to one of carrion, while retaining the strong hooked bill for rending flesh, have lost the powerful talons and the accompanying strength of limb, so that now they even spring from the ground with difficulty.

But if one examines more closely such a group of birds as the hawks, all having the same type of food, one discovers differences of form of body according to their method of securing their prey. There are, for example,



A PIED-BILLED GREBE

The grebes dive for their fish and pursue them under water. Their powerful legs, with large lobed toes, are placed so far back that, although they are most graceful on the water, they are practically helpless on land.

those like the red-shouldered and red-tailed species, which find their quarry while soaring high in the air with their keen eyes fixed upon the ground. These have broad, rounded wings, fanlike tails and rather heavy bodies. Others, like the marsh hawk, beat back and forth close to the ground, seldom if ever soaring, and these have long, narrow wings and slender bodies. Still others like the Cooper's and sharp-shinned species, remain perched on some outpost awaiting the approach of their quarry and then dart out after it, and these have short, rounded wings for sudden bursts of speed.

Another group of animal feeding birds are those which feed upon fish, frogs or crayfish. Practically all have long, pointed, javalin-like bills for spearing their prey, but their various methods of catching the fish have brought about modifications of their other structures. The



A GREEN HERON NEAR ITS NEST

The bill is like that of the kingfisher, but the legs and toes are modified to assist it in stalking its prey through the shallow water.

herons and cranes, which catch their fish by stalking them in shallow water, have long, slender legs for wading and long toes to distribute their weight and keep them from sinking into the soft mud. The kingfishers, on the other hand, which secure their fish by plunging from above, have little use for their legs and these, following nature's economy, have degenerated. The terns, likewise, with similar habits, have weak legs, although webbed for swimming. The gulls, which have become scavengers and no longer plunge for their food, have developed somewhat hooked bills for rending the flesh of the larger dead fish upon which they feed.

Another of the fish-eating birds and one that plunges for its prey is the osprey, or fish hawk. This bird still retains the sharp hooked bill characteristic of its family and so, instead of spearing its fish as does the kingfisher, it catches them in its strong, sharp talons which work like a fish gaff. Furthermore the soles of its feet are modified in having sharp, horny tubercles to cut through



KINGFISHER WITH SMALL SUCKER

The bill is an efficient spear, and the legs, being of little importance in its method of fishing, have degenerated.

the slime covering the fish and keep them from slipping from its grasp. Others of the fish-eating birds, such as the loons and grebes, are expert divers and pursue the fish beneath the water. They have powerful legs with strong webbed or lobed toes situated far back like the propeller of a boat so that, although most graceful on the water, they are extremely awkward and almost helpless on land.

The group of insect-eating birds is large and varied for there are many kinds of insects and many ways of securing them. Some insects live in the soft mud about shores and marshes and for these the birds must probe; some live among the leaves and harder soil of the forest floor, and for these the birds must scratch. Others live in the trunks and branches of trees and in order to secure them the birds must be proficient carpenters, supplied chisels for gouging, and still others spend most of their lives darting hither and thither in the sunlight and these must be caught on the wing. Lastly, there are



A LESSER YELLOWLEGS

This bird is provided with a probe-like bill for finding its insect food in the soft mud along shores.



A RUBY-THROATED HUMMINGBIRD

Hummingbirds are provided with long, needlelike bills and hollow tongues for sucking the nectar from flowers. Some species have variously curved bills fitted to the corollas of particular flowers.

those insects which hide in the grass or among the leaves of shrubs and trees, and these must be searched out with keen eyes. And so, among birds, we have probers in the snipe, scratchers in the grouse and quail, borers in the woodpeckers, flycatchers in the swallows and nighthawks, and gleaners in the blackbirds, thrushes, vireos and warblers. In each group we find those modifications of bill, feet, wings, tail, tongue and eyes which best fit the bird for securing the insects in its particular way.

Among the vegetable feeders the largest number live upon seeds and are of rather generalized structure except for their bills which are heavy and conical like those of the well-known sparrow and carried to the extreme in the grosbeaks. There are a few birds like our hummingbirds, the tropical honey creepers and the African sun birds which take a large part of their sustenance from the

nectar of flowers. These birds have slender probe-like bills and tubular tongues modified so as to be best fitted for sucking the nectar from the various-shaped corollas. Among the five hundred odd species of hummingbirds, we find almost every conceivable variation in the form of the bill, from those like *Docimastes*, with probes nearly three inches long for sucking the nectar from large tubular flowers, to those of the tiny *Rhamphomicron*, with a bill scarcely half an inch in length, so short that the hummer alights on the base of the flower and pierces the nectary in an unlawful way. A few have curved bills, one almost sickle-shaped, and others slightly upturned bills, and all are modified for feeding on particular flowers.

Finally, there are birds which feed almost entirely upon fruits and a few, the sapsuckers, which derive most



A HOUSE WREN

This is one of the birds that finds its food by gleaning about the leaves and branches. Its finely pointed bill is a perfect forcep for picking off the squirming caterpillar or the smallest insect egg.



RED-BELLIED SAPSUCKER

The Red-bellied family is at his "sugar-bush." He, like other degenerates, has a brushlike bill for picking up fermented sap.

of their nourishment from the sap of trees. This they secure by drilling series of small holes through the bark and establishing regular "sugar bushes," visiting the different trees as often as the sap collects. Occasionally, in the heat of the sun, the sap ferments and the unsophisticated sapsuckers are treated to a beverage which rapidly causes them to act in a questionable manner. In fact, they have been known to become so confused as to mistake a man's leg for the limb of a tree. The sapsuckers are degenerate woodpeckers, and although they retain the characteristic bill, feet and stiff tails, their tongues, instead of being greatly protrusible, spearlike and armed with barbs as in the true woodpeckers, have become split and brushlike for better gathering the sap.

Were we to consider fully the food of all species, we would discover that there is scarcely an animal or vegetable substance that does not furnish the food of some group of birds. Between the loons and grebes that find their food at the bottom of the lakes, and the swallows that dart above the trees, there are birds probing in the soil, scratching its surface, turning over the fallen leaves, gleaning through the grass and herbage, searching the

leaves and twigs of shrubs, chiselling in the trunks of trees, and climbing about the branches; and each bird has some adaptation, some modifications, that fit it to its own peculiar food and method of securing it.

BIRD LIFE IN FEBRUARY

To all appearances it is still winter and, with all respect to the ground hog, we are likely to have some very cold weather. Perhaps we may yet have our heaviest snows. Bird life too, still presents its winter aspect. The snow buntings, redpolls, and tree sparrows linger about the snow-covered fields and there are yet no signs of returning migrants. It is during February that one learns to expect some of the more unusual winter visitors. Having consumed the food supply of their natural hunting grounds, many species are given to roaming toward the close of winter, appearing far out of their normal range. Pine and evening grosbeaks, Bohemian waxwings, longspurs, crossbills, and snowy owls may be looked for almost anywhere.

Before February has run its course, however, we can expect some uneasiness to be shown by the earliest spring



A TREE SWALLOW

The swallow is teaching its young to capture insects on the wing. Swallows and other fly-catching birds have large mouths, and with their powerful, pointed wings they are experts at catching insects in full flight.

migrants. The horned larks will move northward and become numerous up to the Canadian border, and through the South the robins and bluebirds will desert their accustomed resorts and push toward the icy barrier. If the last of the month is open, the early birds may reach the northern states before the last of the month, perhaps



A CARDINAL GROSBEEK

Here is a bird with a bill fitted for cracking seeds. Although the bill is heavy, it is finely pointed, and does not prevent its owner from feeding on insects during the summer.

only to meet with distress when overtaken by the sleet of some March storm. But they are the harbingers of spring. Grim Winter has lost his grip and they have come to shout defiance. Let them be welcome.

CONTROL OF LARCH MISTLETOE

IN the forest regions of the Northwest mistletoe is so abundant that the damage which it does assumes at times a serious aspect. Recent investigations of the United States Department of Agriculture have shown, for example, that the deterioration of the western larch in the more open and exposed stands of the Whitman National Forest in the Blue Mountain section of Oregon is due to mistletoe. Although not so valuable as yellow pine and Douglas fir, the larch, when free from mistletoe, produces large saw timber. Trees attacked in early life by the larch mistletoe, however, seldom produce a good grade of merchantable timber, and all infected trees show poor health and reduced diameter or height.

In a professional paper of the United States Department of Agriculture, Bulletin No. 317, it is recommended that in making timber sales, all larches affected with mistletoe be cut, whether the trees are merchantable or not. The effect of thinning is to promote the development of the parasite in the crown. It is desirable, therefore, to cut all infected trees, so far as this is practicable, in lumbering operations.

A NEW FORESTRY COURSE

Three hundred and fifty-four students of the University of California have enrolled in the course in the 'Elements of Forestry,' offered this year for the first time by Professor Walter Mulford. This course is designed to present a general picture of the relation of forestry to the every-day life of a nation.

The Association's New President

Charles Lathrop Pack, Forester, Conservationist and Financier, Elected President of the American Forestry Association

MR. CHARLES LATHROP PACK, of Lakewood, N. J., was elected president of the American Forestry Association at the thirty-fifth annual meeting, held in Boston, Mass., on January 17 and 18, and accepted in a happy inspiring address, which was received with applause and followed by proffers by the members of hearty co-operation in the work which he has undertaken.

Few men possess the qualifications that will be brought to the office by Mr. Pack. His training has been broad and comprehensive and his ability as an executive is widely recognized. In the various fields of forestry, finance, and the details of general business organization, the new president has qualified as a specialist. His administration will be well rounded for the simple reason that he will see every part in its relation to the whole. On his work he will bring to bear a mind quick to grasp problems as they may arise and a keen sense of proportions that will enable him to achieve ready appraisal of relative values. To these are added a vast capacity for work, a determination that overcomes difficulties and the ability to command tireless cooperation from those with whom he may be associated. Thus equipped, he enters office with broad achievement assured.

In matters pertaining to forestry Mr. Pack is a figure of national prominence. His interest dates back to the time when the scientific forester was unknown in this country. It was as long ago as 1878 that he made his beginning as a specialist along this line. His experience and training before that time had made him familiar with trees as such, and with forests as a basis for lumbering operations. In his boyhood he had spent much of his time in the white-pine forests of Northern Michigan, and in the woods along the Spanish River in Canada. As early as 1874, 1875 and 1876, he lived in the woods with Tom Smith, a veteran of the forests, under whom he received his first instructions in estimating timber. One of the most vivid memories of these days has to do with the keenness and accuracy of Smith's judgment as to quantity and quality of standing timber, and Mr. Pack has always considered himself fortunate in having had this expert as his first instructor.

The year 1878 found Mr. Pack in the forests of Northern Bohemia and in the Black Forest. It was his good fortune to have a letter of introduction to Herr Katz, who lived at Gernsbach, Baden. Herr Katz invited him to remain for some time at Gernsbach, and extended many social courtesies, as well as giving him unlimited professional opportunities as a student. It was here that Mr. Pack had his first real vision of conservation, a vision that was destined to have an important influence

on his after years. He says himself that theretofore he he looked upon the trees of the forest simply from the standpoint of their potential value in money. Now he began to see their value as a permanent national resource.

During his period of European study he formed the acquaintance of the forester of Karlsbad and spent the larger part of the summer with him in the forest property belonging to the city of Karlsbad and in visiting other similar properties.

In 1882 Mr. Pack spent a good deal of time in the forests of the Southern States, particularly in Mississippi and Louisiana. It was in December, 1882, that he first discovered that the long-leaf pine is only slightly injured by forest fires. As an experiment he set fire to the forest floor in several localities and watched the result. He had been accustomed to see white pine seriously injured and even killed by small fires, and his enthusiasm was intense when he found that the large, long-leaf pine remained almost uninjured after a hot fire. This discovery had an important bearing on Mr. Pack's career. When he had convinced himself that the financial risk from loss by fire was relatively slight, he realized that the ownership of long-leaf timber could not fail to be profitable. Thus entrenched, he was able to induce a number of men to make investments in Southern timber. His efforts played an important part in the development of the Southern territory.

It was in 1882 that Mr. Pack received what is believed to have been the first large fee ever paid in this country for the technical services of a forester. The fee was paid by Jay Gould, then a conspicuous figure in the railroad and financial world. Mr. Gould was considering the purchase of a large area of land from some land-grant railroads and required technical advice. At that time the forestry expert or engineer was unheard of in the United States. At the request of Mr. Gould, Mr. Pack gave the information and opinions that were needed, and he takes a pride in the recollection of the check for \$1,000 sent him by Mr. Gould for his services.

Mr. Pack was an early advocate of perpetuating the forest resources of the nation. He was one of the first in the country to maintain that a forest should be regarded as a crop, that the ripe timber should be harvested, and that it was the young trees that demanded protection and encouragement. His early views on this question are now universally accepted and have played an important part in the National Conservation movement in which Mr. Pack has been one of the recognized leaders.

The American Forestry Association has reason to feel an especial debt to Mr. Pack for his achievement in the interests of forestry during his term as president of the



CHARLES LATHROP PACK

Elected president of the American Forestry Association at the thirty-fifth annual meeting at Boston, Mass., January 17, 1916.

National Conservation Congress. By reason of his deep interest in the subject and his broad understanding of its problems, Mr. Pack caused much of the work of the Conservation Congress of 1913 to be devoted to the study and discussion of forestry. A special committee spent an

entire year in research, and the published reports of the various sub-committees have taken an important place in the national literature on this subject.

Mr. Pack has been a director of the American Forestry Association for several years. He has always been active

in its work and his counsel and advice have been highly valued. As president he will have opportunity for the constructive work for which he is noted, and there can be no doubt that the results of his administration will prove gratifying to the members and friends of the association. He has always taken deep interest in movements for national progress. He was one of the organizers of the World Court Congress, held in Cleveland, in 1915, to further the cause of the world peace along the lines of an International Tribunal. He is now vice-president of the World Court League and a member of the National Institute of Social Sciences.

PRESIDENT PACK'S ADDRESS

President Pack, in response to the toast, "The New President," at the joint forestry dinner at Boston on the evening of his election, said:

"I need not tell you of the splendid work and sturdy qualities of President Drinker. He has served the American Forestry Association with ability and rare tact. The cause of forestry has no better friend. He has set a high standard for the office with which you now honor me. All that I can say, my friends, is I shall do my best to live up to his ideals.

"We are here to consider some of our forestry problems. We recognize the important present and future value of the effort made under the Weeks Law to save the forested lands of New England. This practical and patriotic work should go forward both north and south. It means much to the farmer and the citizen. In this way the interests of the forests and the farm go hand in hand. You are not for standing still, I am sure, on a matter of such vital interest to all our people. The men and women at this meeting are a forward-looking people and it is for you to see to it that the work under the Weeks Law is perpetuated, all honor to the statesman and Senator from Massachusetts; but he needs help, he needs your help; see that he gets it.

"It has been said: 'In time of peace, prepare for war,' but in this matter of forest resources of this country, had we not better say at this time: in time of war, prepare for peace? We must mobilize the industrial resources of this country if we are to go forward as a nation in proportion to our opportunities. Indeed, I think it may be said that after this terrible world war is over the industrial competition will be far-reaching, and for us there will be a victory or defeat just in proportion to our preparedness. If we are unworthy, we shall fail. The forests and forest products will play a large part. A treeless country or a country which abuses its timber resources as we do cannot expect in world competition to continue with economic success.

"In this time of the Great War we become used to unusual things. During the past year more than one hundred and fifty million feet of lumber have been exported chiefly from the gulf states for the uses of the armies in England and France. American lumber may now be found in the war zone of Northern France sheltering the French and English from the rigors of winter.

American lumber was recently taken by the allies of the entente powers to Salonica in Northeastern Greece. It was the export demand for lumber of this character which a few months ago gave a little stimulus to an industry which was prostrate and suffering from the economic conditions which prevailed in this country before the war.

"As late as the seventh century Tripoli was clothed with vineyards and forests and had a population of 6,000,000, but the forests were cut down—and the region is now bare, and the population reduced to a fraction of the former number.

"Spain, well stripped of its forests, has but a fraction of the population which thrived there when it was covered with forests, and was one of the greatest nations in the world.

"Greece has less than a quarter of the population it had when covered with forests, and when it produced the leading statesmen, scientists and writers of the world. Greece in her golden age, was a gloriously wooded land.

"The Island of Mauritius, in the Indian Ocean, was in 1865 considered as a pearl in the ocean, but the forests were cut down to make room for sugar plantations. The streams dried up, the equable climate changed, rains decreased, drought ensued. Then trees were planted, forests are now growing and the island is again becoming the Pearl of the Indian Ocean.

"On the other hand we are told the Mormons found Utah largely a treeless country. They planted trees and have greatly increased the rainfall and the flow of streams and the fertility of the soil by planting forests and orchards.

"Next perhaps to war, taxation is the most powerful instrument of government, capable, if unwisely used, of destroying individuals, communities and industries. Few government functions are less studied by the average citizen, and probably none of its branches less understood, than forest taxation. It is everywhere recognized by foresters, tax experts, and political economists that the general property tax applied to the forests of the United States is unscientific and discouraging to conservative management. The general property tax upon timber has an alarming tendency to become excessive. It is exceedingly difficult to meet because it is imposed annually, while revenue with which to meet it is deferred. This system of taxation has a great tendency under most conditions to hasten the cutting and marketing of the forests. The question of forest taxation is one of the most important and vital in the consideration of the economics of forestry. We cannot expect individuals or corporations, or even cities or towns, to continue to perpetuate an unprofitable experiment. There must be some return on the capital invested. In most of our States instead of timberlands being favored in order to encourage their growth and conservation, not only for the benefit of the owner, but for the use of the people of today and posterity, they are not given an even chance with other properties. The crop of the farmer is taxed when it is ready for the market and no

agricultural crop is taxed more than once. The crop of timber is taxed continually and each year until it is cut. The farmer's crops mature annually; the crop of the timber owner matures once in many years. In this connection I want to commend to the students of the subject, the report of the Committee on Taxation, of which Mr. E. T. Allen served as chairman at the Fifth National Conservation Congress.

"In this country we have been used to too cheap lumber. A thing that is cheap is rarely properly esteemed. Lumber is sold, not at the cost of reproduction, but at only a part of that cost—the cost of discovery and exploitation. To my mind the deplorable condition of our forests in many of the lumber regions of this country is due to its uneconomic use and to the cheapness of lumber. The coarser grades of lumber are so low in price that a large proportion of the value of the fallen tree is left in the woods where the possibility of its economic value ends forever. Foresters, lumbermen, what I want to see is a real conservation of the fallen tree. I should like to emphasize the statement that the perpetuation of our forests and the unremunerative prices of lumber cannot travel together. This is not a popular theme; many of our politicians prefer to dodge the fact. A low estimate of the value of timber left to rot or burn in the woods in this country is more than 100 million dollars per year. The reason this lumber is not saved but is wasted is because it would cost more than 100 million dollars to save and market it. In countries where forest products sell at cost of reproduction plus a small profit this great waste would be saved.

"It seems to me that the farm and forest must go hand in hand. Coal once used cannot be returned; iron once used cannot be put back into the ground; and once used are gone forever, and then the most that can be done is to use them carefully, making them go as far as possible. All our natural resources are of importance, but on the forest I believe more depends than upon any other one natural resource. You tell us iron, coal, other minerals, are rapidly giving out, yet no one has suggested a remedy except to be careful, but the forests can be protected and the waste places reforested. This is our great need of the present time. The future prosperity of our people depends upon it because our farms depend on it. If you travel over this great country you will find in so many places the same conditions existing, the same wasting of the natural resources of the country; the rivers running unused to the ocean—waterpower speeding to the sea without economic use, the forests disappearing, the mines being exhausted, and in but a few of the states has anything really been done to retain and perpetuate these things which are of the most importance, not only to those of us who are here, but also to our children and successors. It is to do our utmost to remedy these evils that brings us here. To this patriotic work of economic preparedness the endeavors of the American Forestry Association are dedicated.

"And in closing, let me say a word about the human side of forestry.

"The American forester, and all true frequenters of the woods, are men of artistic feeling. The tree has ever been the symbol of life, strength, beauty, and the eye of man cannot continue to look day after day upon these stately trees—God-given monarchs of nature—without their beauty being reflected in his life, making him a healthier, happier and better man, and their destruction means not only the removal or decrease of one of our natural resources, from a practical and utilitarian standpoint, but from the view-point of health, morality, spirituality, happiness and beauty. There is no compensation for such a loss."

FOR WOODLOT IMPROVEMENT

THE combined efforts of the New York Conservation Commission and the State College of Agriculture at Cornell should go a long way toward developing ideal woodlot conditions in Broome County, New York, according to a bulletin just issued by the college. This bulletin is the result of a careful survey of the county by the Cornell forestry department, and gives the condition of the county's woodlots and other bodies of timber, with suggestions for their management, so that they will yield a profit to their owners. Lists of trees suitable to this section of the State are given, together with the information that the State Conservation Commission at Albany will furnish such trees in quantity at cost.

In order to furnish demonstrations of applied forestry, two plots have been selected and marked—one in the town of Windsor, on the property of F. L. Goodenough, and the other about ten miles from Binghamton, on a farm owned by C. O. Chase. In each of these plots the owner has agreed to make certain improvement cuttings and to allow persons interested to inspect the work being carried on there.

A copy of this publication, Bulletin 366, may be obtained by any resident of New York, without charge, upon application to the New York State College of Agriculture, Ithaca, N. Y.

THE ANGRY TREE

DID you know that a tree can get angry? There is a kind of acacia in Nevada that not only is "touchy," but as the gardener put it, "goes very mad," says a writer in *Answers*. It is about 8 feet high, and is a very rapid grower. When the sun sets it is ready to go to sleep, shuts its leaves together and coils up its twigs just like a pigtail. If any one pulls that tail—well, the tree doesn't squeal, but it flutters and moves uneasily, and seems to be deeply agitated. If it is ever disturbed by a shock, such as transplanting, the leaves stand out in all directions and quiver violently. Strangest of all, they send out a pungent, nauseating odor that is most unpleasant. It takes this bad-tempered tree an hour or two to get back into good humor.

Children's Department

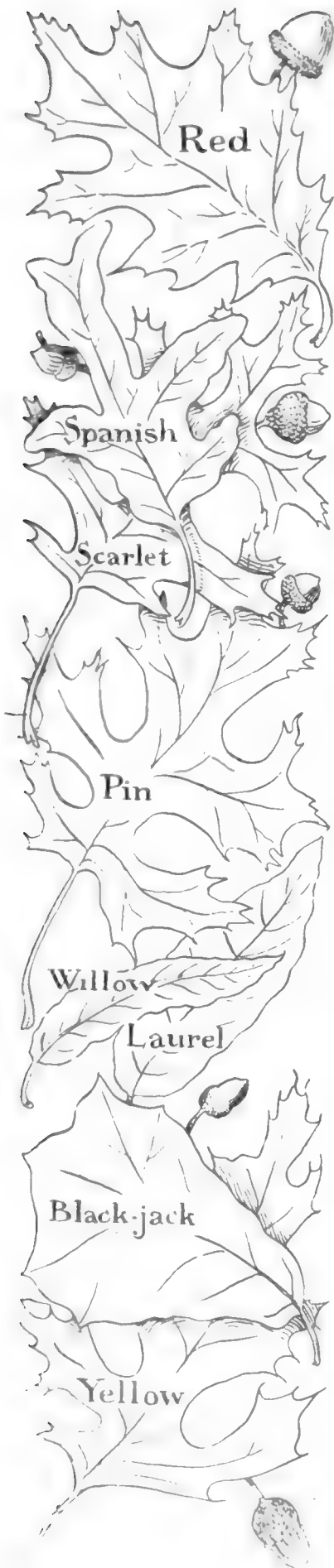
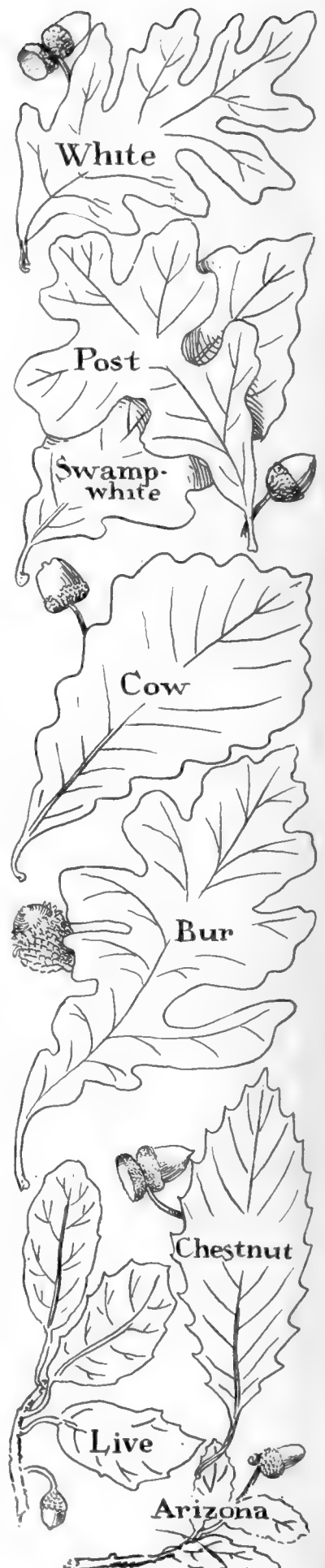
Devoted to imparting information about trees, woods and forests to boys and girls, so that they may grow to know how necessary trees are to the health, wealth and future of their country.

BY BRISTOW ADAMS

OUR OAKS

MOST persons who study trees try to group them according to their relationships, which, of course, is the only wise plan for a strict study. But since we are not so much interested in the relation of trees to one another as we are in the relation of trees to man, we shall in this department group trees according to their uses. Lumbermen rather than botanists have taken to this plan, and have first classified trees as hardwoods and softwoods, although those trees which they call softwoods—the ones which bear cones and have needle-like leaves—do not always furnish the softest lumber. There is the general division of the two great types of trees, most familiar to all of us, into evergreens and deciduous, or trees which drop their leaves in winter, with the general understanding that the evergreens are the cone bearers. Yet here again are exceptions because there are a number of cone-bearing trees like the larch and the cypress which lose their leaves in the winter just as the beech and the maple lose theirs. Then, too, there are the broad-leaved trees, like the magnolia and the holly, which are evergreen. The term "deciduous" is usually applied only to the broad-leaved kinds. Thus it can be seen that most of the general names fail in one way or another to classify the various types. In this department we shall first divide the trees into the two general classes understood by the lumberman's term of "hardwoods" for broad-leaved trees, and "softwoods" for the cone bearers, such as pines, spruces, hemlocks and the like, whether they keep their leaves through the winter or not.

When one thinks of the hardwoods—woods which have been of the greatest use to man because they are hard, and strong, and will wear well under constant use—the oak naturally comes to mind. It has served man since he first began to use wood at all, and it is probable that even before tools were invented, primitive man discovered that a well-seasoned young oak, was, because of its hardness,



weight, and toughness, a most serviceable implement as a staff or a club. It was when he began to make dwellings, however, and to construct boats with which he might travel the seas, that the oak assumed its greatest importance. In structures of all sorts on land and in vessels for sea-faring, it has been one of the most enduring of all woods, and the oak has lent itself readily to a greater variety of uses than any other tree, except, possibly, the palm and the bamboo.

THERE are several hundreds of oaks, and there are about fifty-five in North America. The lumbermen and the botanists both are agreed on two types—the white oaks and the black oaks, the division on the part of the lumbermen being made on the basis of the color of the wood; yet the color of the wood of the white oak is not white, nor is that of the black oak black, but is more likely to be of a reddish tinge, and the trees in the black-oak group are known also as the red oaks.

The main differences between the two groups are that the trees of the red or black-oak variety need two years to mature their acorns, and the divisions along the leaf margins terminate in points. In the white-oak group the acorns are matured in one year and the divisions, or lobes, are rounded. In general, however, it may be said that the leaf forms of the oak are not standard.

The one feature which can be relied on to distinguish the group is the acorn and cup, even though the acorn cup is comparatively small with some forms, and in others the cup almost entirely surrounds the acorn itself. Some idea of the variations of the oak leaves may be seen in the fact that the white oak, for example, has a leaf with rather deep indentations with rounded edges, while the red oak and the pin oak have similar deep indentations with pointed lobes. The leaf of the live oak, an evergreen, has very shallow indentations, and is not unlike that of the holly, with sharp spines along its edges. The willow oak is so named because of its long, narrow leaf that has no divisions and has the general look of the leaves of some of the willows. The laurel oak has a similar leaf, which is larger and broader than that of the willow oak. The chestnut oak is so called because its leaf closely resembles that of the chestnut tree.

THE oaks have a wide range through the country, though they do not grow as far north as the willows, for example. The common white oak and red oak grow all through the eastern half of the United States. The willow oak is not hardy in the Middle Atlantic and New England States, which is a great pity because it is one of America's handsomest shade trees. The live oak grows from Virginia to the gulf coast and westward to California. California has its own peculiar species—the tan-bark oak, which grows among the redwoods, which are also limited to the Golden State. In the Southwest there are many different kinds of oaks, but most of them are dwarfed by the severe conditions in which they have to live, and form a part of the elfin forest of that part of the world, and generally known as chaparral.

See how many different kinds of oaks can be found near where you live. There is no special place to look for them because different kinds will grow either in low, moist situations or on top of the driest hills, or at many places between these two extremes.

TOWER FALLS OF THE YELLOWSTONE

THE Tower Falls is one of the most beautiful waterfalls in the United States, which is the less often seen by travelers to the Yellowstone region because of its relative inaccessibility. The fall itself is a magnificent sheer drop of milk-white, foamy water, but



Photograph by Iddings, U. S. Geol. Survey.

THE TOWER FALLS

The milky whiteness of the Tower Falls of the Yellowstone, the dark green of the nestling trees and the protecting strength of the surrounding mighty rock towers combine to form a beautiful and inspiring sight.

the great beauty and majesty of its setting are what also fascinates. The river pours forth from a group of mighty rock towers rising nearly 2,000 feet above the bottom of the canyon, forming spires and pinnacles, with massive bases of granite; but clothed here and there with the dark green of the mountain pines and firs. Some 20,000 horsepower might be developed from these falls, but the iron hand of the Government wards off all private spoliation of this great natural wonder, the entire Yellowstone region being permanently reserved for the benefit and enjoyment of all the people for all time.

Wood Older Than the Hills

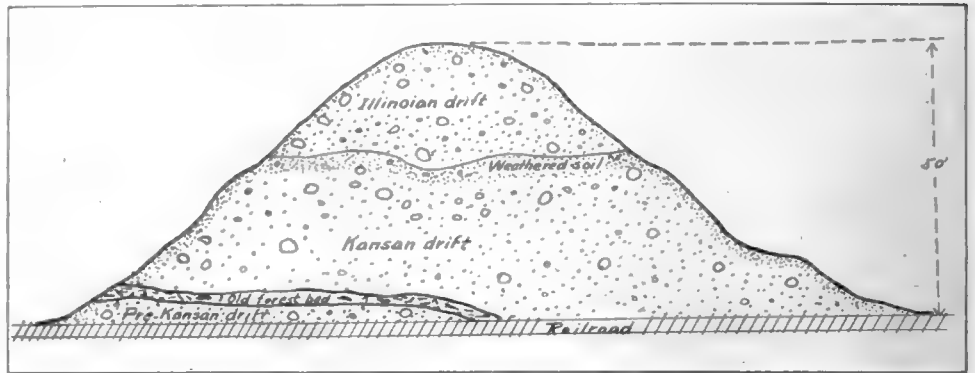
By ARTHUR KOEHLER

Expert in Wood Identification, Forest Products Laboratory, Madison, Wisconsin

SPECIMENS of wood, which are veritably older than some hills, have recently been unearthed in a railroad cut at Woodville, in St. Croix County, Wisconsin. The wood, somewhat mixed with black soil, was found in a layer four to twelve inches thick in the base of a hill fully fifty feet high.

Some fragments of the wood were sent by Mr. S. Weidman, of the Wisconsin Geological Survey, to the Forest Products Laboratory, Madison, Wisconsin, for identification. The wood was very brittle and much distorted, most of the cells being flattened. However, by cutting thin sections of the wood and viewing them through a microscope, the characteristic structure of the cells could be made out. The wood proved to be spruce.

Geologists explain the occurrence of the wood so far



WHERE 500,000 YEAR OLD SPRUCE WAS FOUND

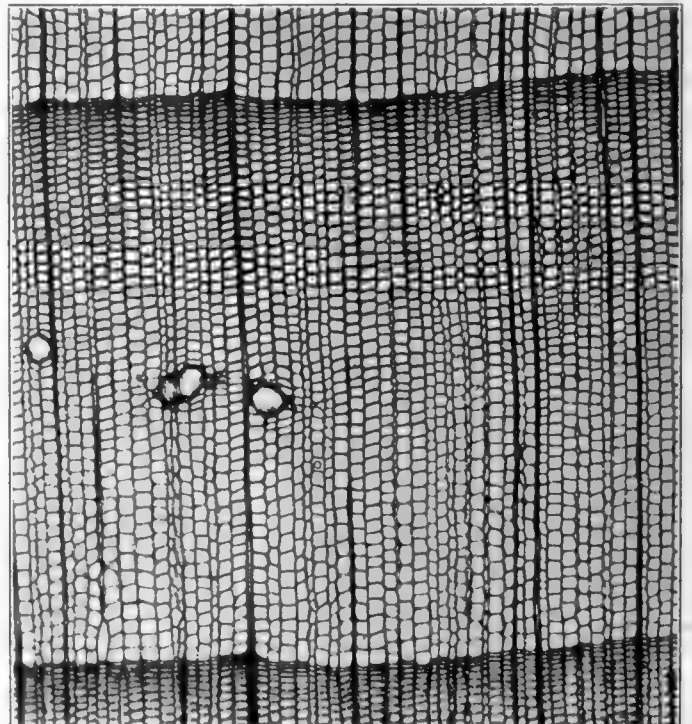
Note section of this diagrammatic sketch of a railroad cut near Woodville, Wisconsin, marked in the sketch "Old Forest Bed." It was in this bed that specimens of the spruce, estimated to be 500,000 years old, were found. The explanation of how they came there is given in this article by Mr. Arthur Koehler, of the Forest Products Laboratory, Madison, Wisconsin.

under ground something like this: Ages ago a thick sheet of ice (glacier) covered the greater part of the State of Wisconsin and neighboring States, and moved slowly southward. Heavy masses of ice will "flow" in the same manner in which a brittle piece of molasses candy will gradually spread out on a plate. At the end of the



CROSS SECTION OF SPRUCE 500,000 YEARS OLD

This photomicrograph of spruce, magnified at 50 diameters, found in glacial drift in Wisconsin. It grew there, expert geologists estimate, about half a million years ago. Most of the cell walls are flattened, though a few were infiltrated with limestone.



CROSS SECTION OF NORMAL SPRUCE

Photomicrograph of present-day spruce. Note the difference between it and the prehistoric specimen recovered from the glacial drift. Magnified fifty diameters.

glacier, where the ice melted, it deposited a great amount of soil, which had become mixed with the ice in its journey southward.

This lower deposit at Woodville is designated as the pre-Kansan drift. The time came when the lower end of the glacier melted faster than it could move, and consequently the terminal margin receded northward, allowing vegetation and even trees to encroach upon the deposit. The fact that the wood which was found is spruce, however, indicates that a moderately cool climate prevailed, for even now this species is confined chiefly to the northern latitudes and high altitudes.

Later, probably some 500,000 years ago, the climate again became cooler, allowing another glacier to come down. The forest was destroyed and buried under a mass of ice and gravel. Again the glacier was melted and deposited a deep layer of soil, forming the Kansan drift, on top of the remains of the forest. Long after the Kansan drift was deposited on the forest bed a third glacier descended and later receded, depositing the Illinoian drift.

These theories may seem "far fetched" to those who have not studied the formation of our land areas, but to the geologist they offer the only logical explanation of present conditions. At the present time in Alaska some glaciers are slowly pushing their huge ice masses along to the utter destruction of all forests and other plant life in their path. Other glaciers are being melted faster than they can advance, and, consequently, their terminals are receding and depositing large masses of earth and stones.

HOW BIRDS PLANT TREES

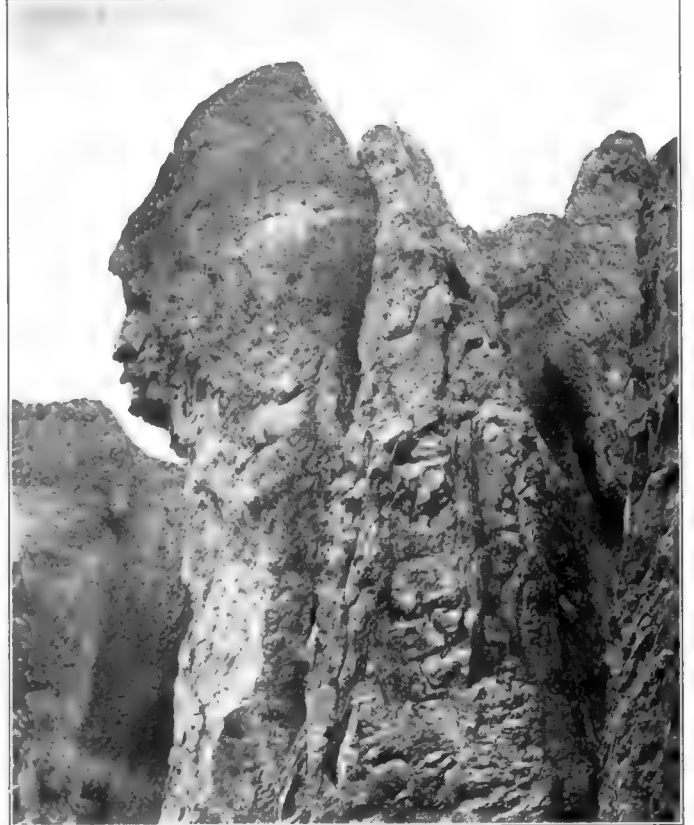
DR. M. W. BLACKMAN, Professor of Forest Entomology, Dr. L. H. Pennington, Professor of Forest Botany and Dr. C. C. Adams, Professor of Forest Zoology in the New York State College of Forestry at Syracuse University attended the meetings of the American Association for the Advancement of Science held at Columbus, Ohio. Dr. Adams, while there, read a paper before the Wilson Ornithological Club on the relation of birds to the Adirondack forest vegetation. He spoke of the damage done by sap suckers to aspen, yellow birch, beech, hemlock, etc. He brought out the fact that much burned over land is planted through the action of birds in carrying certain seeds; especially is this true of bird cherry. This bird cherry forms a temporary cover on otherwise barren soil, preventing erosion and acting as a nurse crop for future forest trees. The Ecological Society of America was organized, Dr. Adams acting on the organization committee. One hundred botanists and zoologists are charter members of the society.

SAMPLE COPIES OF AMERICAN FORESTRY

MEMBERS of the American Forestry Association having friends interested in trees, woodlands and forests are urged to send their names to the association and a sample copy of the magazine, *AMERICAN FORESTRY*, will be sent to them with the compliments of the member.

THE COWLED MONK

THE human face is found in many natural rock carvings in different parts of the world, and almost every western State has one or more of these natural statues, carved so perfectly by the action of the elements as to be startling in their expressions. Perhaps none is more striking than the "Monk's Head," in Coony Canyon,



Photograph by Searle, U. S. Geol. Survey.

THE COWLED MONK

There are hundreds of rock faces in the United States, but perhaps none is more striking than that of the Cowled Monk in Coony Canyon, New Mexico.

yon, New Mexico, a freak of nature that brings out in clear profile a man's face, with the head appearing to be hooded. The figure is of giant proportions, and at a little distance, sharply outlined against the sky, it seems impossible that it is not the work of some ancient people who may have wrought upon it with crude tools, yet obtaining a singularly strong and virile expression of countenance. Fantastic tales are told by the New Mexico Indians concerning the origin of this rock head, and at one time it was believed to have been worshiped by the natives of the Southwest. The photograph was taken by Engineer A. B. Searle, of the United States Geological Survey.

KENTUCKY'S FORESTRY BUILDING

STATE FORESTER J. E. BARTON, of Kentucky, has inaugurated a plan for the erection of a permanent forestry building on the State fair grounds, the building to be erected of wood donated by the timber interests of the State. His plans call for the exterior to be of the rustic wood and the interior showing the grain of the various woods. He has met with splendid encouragement and the building is practically assured.



INSTRUCTING CHINESE STUDENTS OF FORESTRY

The teachers in these schools are young men who have been trained in forestry schools of the United States, and the reforestation of eastern China and the lumbering of western China will follow methods approved in this country. The forestry movement in China, while only a few years old, is making excellent progress despite the great difficulties to be overcome.

Lecturing in Chekiang

By D. Y. LIN, M.F.

[Part of the enormous task of providing for the reforestation of denuded China is to first educate the people on the necessity for conservation and for reforesting the non-agricultural lands. Owing to the fact that there are few newspapers or other publications, it is necessary to do this by lectures and addresses. It is this character of the work and its effects which Mr. Lin describes in the accompanying article.—EDITOR.]

IT was on the 24th of May that we received word from H. E. Governor Kyiuh that he would like to have me accompany him on his tour of inspection in the northern interior of Chekiang. The tour lasted two weeks, and we took in the principal cities, Kienteh, Lungyu, Tsaryen, Lanchi, Chüchow, and Kinwha, all along the Tsientang.

The Tsientang is the chief river of Chekiang. Rising in the western hills of the province, it follows a generally northeasterly direction and falls into the Bay of Hangchow. Its basin occupies nearly half the province, and by means of boats and rafts the river serves as a means of communication for many hundred miles. Small steam launches can go up as far as Tung Loo, but after passing that point small boats and rafts have to be used. Often the river gets very shallow, with many rapids, and it was a sight to see the boatmen heaving and yelling as they tried to get their boats past such places.

The scenery along the Tsientang is superb. The

whole region has been called by some writers "a most varied and charming hill country, which doubtless some day will be as well known to the tourist as the Japanese hills." Beautiful these hills and mountains are, but when going through them one cannot help noting how treeless they have become, and how they are just a picture of wanton deforestation. Small patches of pines could be occasionally seen marking the place of graves. The Governor frequently remarked on these scattered clumps of trees and said sarcastically, "Those are for the benefit of the dead, who are thus better provided for than the living." Some of the mountains are depleted entirely of tree growth, and frequent fires have gone over them so that the effects of erosion and gullying are visible from a distance. In the vicinity of Lungyu hundreds and hundreds of acres of hill lands have been left practically bare of all vegetation. This land could be easily forested and made into productive timbered land, and a protection for

the farmlands below. In Shan teu, a little village near Lanchi, a long range of mountains is entirely devoid of tree growth, with streaks of exposed, reddish soil everywhere seen. The people are suffering not only from economic effects, scarcity of wood and fuel, as a result of this ceaseless cutting and burning over these hills and mountains—forest fires were everywhere noted—but also from physical effects. Water and forests are very closely connected. Without forests, water cannot be permanently regulated; floods, erosion, and mechanical depreciation of soil will be the result. The people of the different places visited are full of stories of how their rice fields are at the mercy of floods, their fruit orchards often made worthless through gullying, and how the irregularity of the flow in the Tsientang has been a great hindrance to their traffic and trade.

Now, it was in such a region that Governor Kyüih wanted me to lecture to educate the people on the importance and in the methods of conservation or development of forests. My lecture was a demonstrated one, and was well understood by the natives. Everywhere I spoke the leading men and students made up the audience. In most of the places, public meetings were unknown, and in such places we had hard times finding suitable halls. On our arrival in the towns the Governor would send out proclamations regarding the lecture and as a consequence the capacity of the hall was always taxed.

In Kienteh the lecture was held in the Anhwei Guild Hall, the largest in the city, and even then it was necessary for the lecture to be repeated to a large overflow crowd which could not get in for the first lecture. In Tsaryen the largest temple in the city was given me as a lecture hall. I stood surrounded by my charts and apparatus in front of towering idols. The attendants whom the local magistrate had provided for my assistance did not hesitate to hang some of the charts from the gilded idols themselves. It must have been a strange sight to the audience, but it was one of the most interesting experiences of the trip. There were not seats enough, so soldiers bearing the magistrate's card were sent from house to house to borrow chairs to seat the audience. Meetings in Lanchi, Lungyu, Chüchow and Kinwha were equally successful.

In Chüchow the meeting was held in a large theatre and the audience numbered about eight hundred. Kinwha, the last city in which I spoke, has many schools, and the Governor suggested that I speak twice, so all the students might hear. Notices were sent out to that effect. There was a terrible downpour of rain at the hour I was scheduled to speak, but in spite of that there were about a thousand people present at the two meetings. Altogether, there were about four thousand people who heard the lecture during the itinerary, and this is significant when we think that these audiences were made up of leading men, officials and students.

The most unique feature of this trip was the Governor's tree-planting ceremonies. In all places visited he planted a few trees in the presence of a few officials and leading gentry, to mark his visit and show the importance of forestry. The planting ceremony generally preceded

my lecture and I never failed to call the attention of the audience to the importance of the work of the Governor and tell them it was his sincere wish that they cooperate to give proper emphasis to forestry. After each of my lectures, a discussion would follow, in which some of the local forestry problems would be brought up for consideration, and I only regret that I could not have stayed longer in each of the cities to study these problems, and to offer practical suggestions if desired.

Coming back to Hangchow, where all the schools, colleges and societies had been instructed by the Governor to line up to hear me, I gave a series of ten lectures in the auditorium of the Government Law School. Although the weather for the week was not favorable, yet the numbers that came to hear were far from discouraging. There were 1,840 of the leading gentry, officials, and older students who attended. One of the lectures was given exclusively to the girl students, and it was most gratifying to note that some of them came with paper and pencil and had been instructed by their teachers to take notes and ask questions regarding conservation. By far the most important meeting in Hangchow was that principally for discussion, in which about 150 leading men of the city participated. Mr. Wen, Commissioner of Foreign Affairs for Chekiang, was chairman of the discussion meeting, and the purpose of the meeting may be summed up briefly in his eloquent words: "Now we have heard enough about conservation of forests, their value in human economy, and the effects of deforestation and wanton use of our non-agricultural lands. Mr. Lin has within the last few weeks planted enough trees in our brains. Time for action has come and it behooves us to take these trees from our brains and transplant them on our many denuded hills and mountains around." The spirit with which these leading men brought different problems up for discussion was indeed exemplary, and one would wonder why a forestry movement had not been started earlier among them.

The results of my three weeks' continuous lecturing on conservation have certainly been most encouraging, and they may be summarized as follows:

1. Seven (7) cities visited and as many as 5,840 leading merchants, officials, and students reached.
2. Movement for formation of a Forestry Association for Chekiang is now under way. And what is still more encouraging is that some of the leading men in Hangchow are going to start, with their own money, a demonstration forest on one of the hills by the famous West Lake. It is their hope that the forest may some day serve to demonstrate to the people of Hangchow the advisability and practicability of reforestation. Here we wish them the best of success.
3. The Civil Governor has taken definite steps. He has issued proclamations to the seventy-five local magistrates, instructing them each to plant at least 150 *morv* every year, and to enforce the Central Government laws, as adopted last year. The following is a very rough translation of parts of the Governor's 1,220 word note to all the local magistrates:

"After a tour of inspection, which I undertook at the

request of the President and the Ministry of Agriculture and Commerce, I have been led to believe that mountain lands throughout the province of Chekiang that are not fit for agriculture, cover six to seven-tenths of the entire provincial area. These non-agricultural lands are treeless and often bare of vegetation of any kind.

"People living in these regions are poor and have suffered fearfully through non-use of these mountain lands. Idle lands are a detriment to society. The people are not only paying high prices for wood on account of wood-shortage, but also frequently experience destructive floods, winds, insects, etc., which could be stopped if these lands were properly utilized.

"I have tried to find out the causes for such a state of things and come to the conclusion that lack of forest is the principal cause.

"The benefits of forests are many, but I shall mention only the following:

1. Forestry, as compared with agriculture, requires very little labor.
2. Thinnings and intermediate cuttings can be used for fuel.
3. Many valuable fruits are from forest trees.
4. Matured trees furnish good timber for construction.
5. Forests prevent drought and afford best cover to soil.
6. Forests check, or at least lessen, the severity of floods, through absorption.
7. Forests stop soil erosion and consequent silting up of streams.
8. Timbered lands can often be used for grazing purposes.

"For these and other reasons, I hereby ask you to help promote forestry through the province. Consultations with leading men and gentry in your *hsien*¹ will be necessary. In your *hsien* select three or four areas for planting, each to be about fifty (50) *mow*. For buying seedling stock and preparation of land for planting spend about \$200.00. If the areas selected be on private lands, ask the owners to help do the planting, and in case they refuse, proceed and plant anyhow. Nobody shall in any way prevent. After the different areas have been planted, it will be necessary for the local police to protect them from fire and thieves.

"When all this is done, a detailed report will be in order. Organize the local people and induce them to undertake private planting. Determine also the area to be planted in future for your *hsien*.

"I shall detail a man to make visits ere long, to see if all the *hsien*s are following out the instructions as given here. Due punishments will be given for neglect and delay."

Such a well-thought-out proclamation is significant, and the Governor is certainly setting a high standard. It is hoped that other provinces will follow suit, to make China, which has been called "the horrible example of forest neglect," a land in which to live happy, healthy and useful lives.

¹Hsien means a district.

FAREWELL, OLD TREE

BY PAULINA BRANDRETH

Fair standest thou, O pine of royal girth,
Amid thy virgin host. Straight as a mast
Thy fluted column towers from the earth,
And calm thy rugged trunk doth meet the blast,
And wide thy fronds of evergreen are cast
Upon the living air. A perfect whole
Thy figure doth commemorate the past.
Unmindful of the years that onward roll
Thy steadfast beauty touches heart and soul.

Alas! we see thee fallen. Wrecked and shorn
Like Samson of his strength, thou liest low;
Thy mighty limbs of bygone ages born
Are stretched upon the moss in silent woe.
No longer will thy head be crowned with snow,
Nor will our eyes aspiring behold
Thy silhouette where sunset currents flow.
Farewell, old tree, farewell! Thus art thou sold
In all thy splendor for a pot of gold!

MT. KATAHDIN FORESTRY RESERVE

A CORRESPONDENT from Bangor, Me., writes: At the annual meeting of the Maine Sportsmen's Fish and Game Association, just held in Portland, the members of the organization went on record as very enthusiastically in favor of a National Forest Reserve in the Mt. Katahdin section, a bill for which is now before Congress. The scenic beauties of this section are well known and there is much valuable timber land as well as a great deal of game. Much of the land in this section is owned by the Great Northern Paper Company and there has been considerable speculation if the National Forestry Reserve should be formed in this region if it would include the famous Ripogenus Gorge, one of the scenic beauty spots of Maine. At Ripogenus the Great Northern is engaged in building a huge dam for the purpose of greatly increasing the water power, which has immense potentialities.

WHAT ABOUT YOUR TOWN LIBRARY?

DOES the library in *your town* take AMERICAN FORESTRY?

Will you let the American Forestry Association know?

There are pages of information in it each month which are of particular value to the residents of *your town*. Information relating to trees which may save the residents worry, expense and loss.

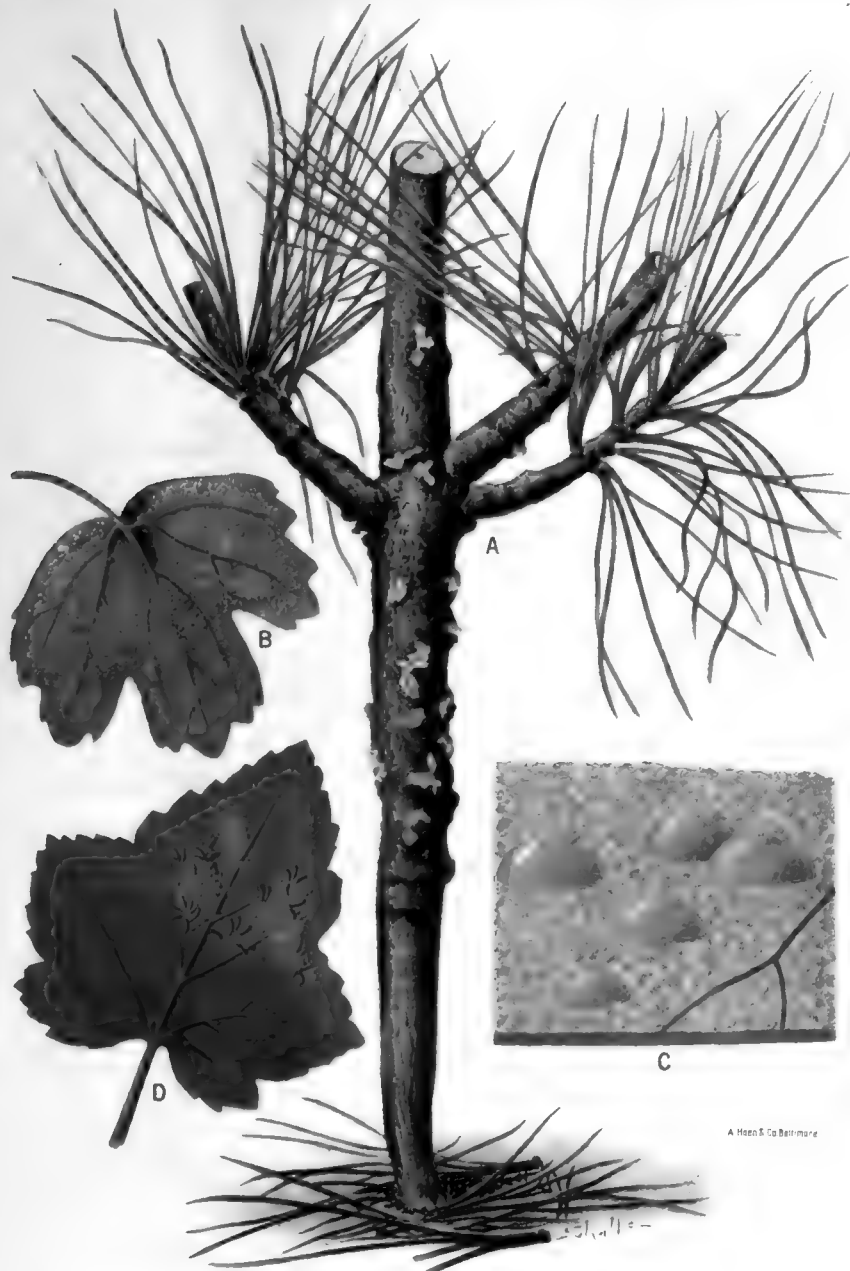
If the library kept AMERICAN FORESTRY on file it would save *your town* much in the course of a year.

THE BLISTER RUST DISEASE OF WHITE PINE.

By DR. PERLEY SPAULDING

PATHOLOGIST U. S. DEPARTMENT OF AGRICULTURE

[The White-pine Blister Rust which has been discovered in various sections of the New England States, New York State and in Ontario, Canada, threatens to do most serious damage to white pine and western sugar pine in the United States and Canada. There apparently is no way of overcoming it except to prevent shipments of pine seedlings from the infected sections, and by destroying infected pine trees, and currant and gooseberry bushes. This article and illustrations tell how to ascertain the presence of the disease, and what to do when found, and also sounds a warning against mistaking another for it.—EDITOR]



THE WHITE-PINE BLISTER RUST

Figure "A" shows a young white pine with open blisters and swollen bark.
 Figure "B" shows a leaf of flowering currant bearing the early currant stage.
 Figure "C" is a part of the same leaf much magnified and showing four of the spore masses.
 Figure "D" shows a black currant leaf bearing the late filamentous stage, this being the stage in which it is transmitted to the pine trees.

"A," "B" and "D" natural size.

The White-pine Blister Rust is such a serious disease, and conditions are so favorable for its ultimate spread throughout the area inhabited by the white pine in this country, that the danger is very grave.

It is also known to attack the sugar pine of the Pacific Coast region; the western white pine of the northern Rocky Mountain region and the lumber pine of the Rocky Mountain region.

The U. S. Forest Service estimates the value of these pines at \$411,000,000 divided as follows:

White pine—New England States, \$75,000,000;
 Lake States, \$96,000,000; Western States, \$60,000,000;
 on National Forests, \$30,000,000.

Western sugar pine—Western States, \$105,000,000;
 on National Forests, \$45,000,000.

Wild currants and gooseberries, which transmit the disease to the pines, are prevalent in the regions where these pines grow. While the disease is known to be present now only in the Northeastern States, it would be a matter of but a few years for it to reach some parts of the Pacific Coast or Rocky Mountain regions on pine nursery stock if shipment continues without restraint. The forest conditions there are such that if the disease once reaches the native forests there is no possibility of controlling it. This disease threatens not only the Northeastern States, but also the Pacific Coast and the Rocky Mountain regions.

While the situation in the Northeastern States, where the White-pine Blister Rust is now present, is critical and much worse to attempt to handle than it was in 1914 and previously, yet the nature of the disease is such that there is even now a fair chance to control it, if unanimity of action and adequate authority can be secured. The areas which are badly infected vary in size from only a few square yards up to one of hundreds of square miles. The only thing which will prevent any further spread of this disease in any one of these infected areas is the removal of all wild and cultivated currants and gooseberries, and of the diseased pines within those areas. Otherwise the disease will live in the pines as long as they remain alive and will be a constant source of danger to that neighborhood, as well as to the entire country.

WHAT SHOULD BE DONE.

Any person owning a plantation of white pines imported by himself or through a broker, or bought of a nurseryman without a definite guarantee that they were raised in this country from seed, may find this disease present. Although many American nurserymen in the past have raised most of the white pine stock distributed by them, it has been the rule rather than the exception for them to supply part of their trade with imported stock. A very large proportion of this imported stock has been shown by actual experience to be infected.

If an owner believes he has found any symptoms whatever of this disease, his best course is to take specimens in generous quantity, and in order to insure a prompt reply, mail them to the writer at the Bureau of Plant Industry, Washington, D. C. A positive identification of the disease will be made, so far as that is possible, and advice given concerning further action.

It is inadvisable for any owner to attempt to handle the disease without expert advice. Experience with this disease is very necessary in order to determine the extent of the disease and the best method of handling it in each case. Pieces of pine branches of trees of course may be sent as they are cut from the tree. Diseased currant or gooseberry leaves should be laid flat between folds of newspaper or blotting paper and then mailed in the ordinary way. Any owner who believes he has the disease upon his property should remember that a diseased pine will remain diseased as long as it lives, and if no attempt is made to control the disease upon his property he will be the first to suffer from it and will also probably suffer the greatest damage.

DO NOT MISTAKE IT.

In the Eastern States a native parasite often occurs upon the leaves of wild currants and gooseberries which forms yellow spots upon the lower surface of the leaves. These spots are usually from an eighth to a fourth of an inch in diameter (much larger than the blister rust spots) and do not have the powdery appearance that characterizes the blister rust disease.

DESCRIPTION OF THE DISEASE.

This disease was not discovered on pines in this country until 1909. Then it appeared as shown on the

accompanying color plate in figure "A." This is a full-sized drawing of a 4-year-old white-pine tree affected by the disease. The yellow spots with irregular white edges are the open blisters of the parasite breaking through the smooth bark of the young tree. The white edge is part of a very thin, rather tough, white membrane. This, at first, is completely closed and is somewhat rounded, much resembling a blister. After a few days the top of the blister breaks loose and falls off, leaving merely the ragged edges of the membrane projecting upright around the cavity in the bark. Upon the breaking of the blister, it is seen that the entire cavity within is filled with a mass of very fine, bright yellow powder (spores). This is the stage of development shown in the colored plate. Each grain of this powder acts as a seed in starting the disease in a new place. It will also be noted that there is a certain amount of irregular swelling of the stem and branches shown in this figure.

Such swelling is very characteristic of this disease. Before the blisters have formed in the bark, the young tree may show this same irregular swelling, but with absolutely no external break in the bark tissues. These blisters are found from the latter part of April to about the middle of June, depending somewhat on the earliness of the season and the locality. Very curiously, the parasite causing this disease cannot spread directly from pine to pine, but must live for a time upon the leaves of wild and the cultivated currants or gooseberries. The yellow spores from the pine infect the leaves of currants or gooseberries, and after about two weeks produce numerous tiny masses of orange-colored, mealy powder on the under surface of the leaves. These masses are hardly larger than the head of a pin and may be very scattered or may be so abundant as to form an almost continuous dusty layer, from which clouds of yellowish powder float when the leaf is disturbed. This yellow powder is a second form of spore, which in turn is able to infect more currant or gooseberry leaves.

This stage of the disease occurs from June 15 until killing frost, when the leaves of the currants fall.

Figure "B" shows a flowering currant leaf affected with this stage of the disease.

Figure "C" shows a portion of this leaf much magnified. The infection of new currant leaves at this stage may be repeated and a considerable number of generations of this stage of the disease developed during the season. Upon the beginning of cooler weather, however, there is produced upon the lower surface of currant and gooseberry leaves a third form of spore. These occur in the form of small groups of hairy outgrowths, each of which may contain from two to ten or a dozen filaments hardly one-fourth inch high, usually arranged in small circles.

Figure "D" shows this stage. Upon these filaments are produced numerous tiny spores. These cannot attack the leaves of currants or gooseberries but are able to attack the young bark of white pines. All of these three forms of spores are mainly distributed by the wind. The last-mentioned form of spore is found from the latter part of July until the leaves fall, and infection of the pines occurs immediately. When one of these spores alights upon the bark of a young pine, it begins to grow as does a seed, and pushes its roots into the living bark tissues. After once gaining entry to the soft bark it grows rather slowly and there ensues a "period of incubation" during which nobody can say whether the tree is diseased or not. This period varies from somewhat less than a year up to six years or more before a visible development of the disease can be detected. At the end of this incubation period more or less swelling usually develops in the bark at the affected point, and is later succeeded by the formation of the blisters.

Nut Growing, a New American Industry

BY WILLIAM C. DEMING

MOST people who live in cities come to think, if they think about it at all, that the city is the whole thing. The country is well enough for a couple of weeks' vacation in the summer, or as a source of milk and country sausage, but the city with its hurry and bustle and vast business interests is the really important thing on which all else depends. Nothing of the kind. If the cities were all destroyed and the inhabitants distributed among the farms everybody would get along pretty comfortably. But if the farms were destroyed the great cities of the world would perish in a few days. The farms furnish the food for the cities.

The cities are growing faster than the farms. How are we going to feed the great city populations of the future? Is it to be on the present hand-to-mouth system of agriculture, with annual crops sown in the spring and reaped in the fall—if the weather is good? A bonanza king if it rains just right, a near-bankrupt if the weather and bugs are bad? Or are we going to develop a more stable and permanent system of agriculture in which tree crops shall have a prominent place?

A tree is a permanent thing. It lasts for years or hundreds of years. It doesn't have to be sown or planted every year, and hoed and cared for like a grain crop or potatoes or beans. Once its great roots go down into the earth it is pretty nearly independent of flood and drought. Pigs and sheep and cattle can graze under its shade and do it good rather than harm. And if your tree is a "great engine of production," an oak, chestnut, walnut, hickory, fig, pawpaw, persimmon, mulberry, carob or honey locust, the dropping therefrom will fatten the animals without labor by man.

Nine-tenths of our crops go to nourish our domestic animals and much of our work is waiting on them. If we can manage so that the animals will wait on themselves, and there is nothing that agrees with them better, we shall have more time to play with the children.

Of all the tree crops nuts are the most important be-

cause they are the richest natural food substance known. A nut is a seed, the result of Nature's supreme effort to pack as much nourishment as she can into the smallest possible space for the nourishment of the future young plant. Compared with the concentrated richness of the nut the red-cheeked juicy pulp of the apple or peach is but a sip of sweetened water, very pleasant to the taste and important in the dietary but of little value as food.



THE BEAUTIFUL SIGHT OF AN ALMOND ORCHARD IN BLOOM

The almond industry is steadily growing in this country, and is a profitable one. The blooming orchards are worth going miles to see.

NUTS AS FOOD

Many nuts, on the other hand, contain as much muscle-building food as rich cheese, a third more than beefsteak, twice as much fat as cheese, five times as much as beefsteak and seven times as much as eggs. Chestnuts contain 70 per cent of starch, nearly as much as the best wheat flour and four times as much as potatoes. Peanuts and hickory nuts are three times as nourishing as beefsteak. When you think of it that way it hardly seems to be the thing to munch casually triple extract of beefsteak from a street nut stand or after a hearty dinner.

The bad reputation for digestibility that nuts have is due to such things. Eaten at the right time, in the right amount and properly chewed they are as digestible as any food of equal richness.

A fifty-pound bushel of black walnuts costing one



A GREAT ENGINE OF PRODUCTION

A Pennsylvania English walnut tree, which not only admirably shades the building and the road, but furnishes a large annual crop, and at the same time is very valuable timber.

dollar yields $12\frac{1}{2}$ pounds of meats whose fuel, or food, value is 37,500 calories. The same number of calories in beefsteak at twenty-five cents a pound would cost over nine dollars. The buyer must crack the nuts and take out the meats himself, or have the children do it.

Butternuts are equally cheap and nourishing, but the proportion of meat to shell is less. The flavor, however, is more agreeable to most people.

Chestnuts, the large imported kind, when bought in quantity, are a fairly cheap source of starch, but not as cheap as wheat flour.

A bushel of hickory nuts at three dollars yields as many calories as sixteen dollars' worth of round steak.

Is not the nut being neglected as a source of cheap food?

They are sanitary when not spoiled, and their protective qualities are great. They take the place of meat without its possibilities of indigestion or poisoning. But with the exception, that nut

meats passed through unknown hands have lost Nature's sanitary insurance.

TREE CROPS IN THE WORLD

This country is still but a healthy growing boy going to school to learn how to manage himself when he is grown up; and, naturally, in nut growing, as in many other things, his teacher is the grown-up old world. Over there they learned, centuries ago, the value of the tree as a food crop producer, and trees furnish the chief food and support of many people. In Mediterranean countries the land is one-third or one-half covered with trees growing crops for man and his beasts—figs, olives, acorns, carobs, chestnuts, almonds, walnuts. A man there can go to sleep for six months, have typhoid fever or take a sabbatical year off without losing much on his crops.

In parts of Italy they make



A CUT-LEAF ENGLISH WALNUT

This tree is not only an ornament, but is a worker, too. A fifty-pound bushel of walnuts, costing \$1.00, is equal in calories to beefsteak costing \$9.00.

their bread of chestnut flour. In Corsica they feed chestnuts to the horses. In Portugal the pigs are entirely fattened on acorns. Farms are valued according to the number of acorn oaks, chestnuts or walnuts. The chief income of many farmers is from walnuts or chestnuts, filberts or almonds, millions of dollars worth of which are exported to us, when we ought to be growing them ourselves.

IMPORTS OF NUTS

Our annual imports are \$15,000,000 in nuts and nut products, in normal times, with an average yearly increase of about a million dollars.

NUT GROWING IN AMERICA

And yet this country is just as good as anybody's country for growing nuts. We have such a diversity of climate that we can grow most of the world's varieties here in America, though it will take us many years to develop over the whole country the permanent system of agriculture, furnished by nuts and other tree crops, which has been built up through centuries in many older countries.

In some parts of this country, however, a splendid beginning has already been made. The walnuts and almonds of California bring even higher prices than the imported but do not nearly fill our needs. The new pecan grown in our southern states is a wonderful thing. Most people's idea of a "pea can" is a little red nut that lurks in the bottom of the Christmas bowl when all the good nuts have been picked out; a nuisance of a nut that cracks all to pieces and has to be eaten with a hairpin. These are the common wild Texas pecans worth four or five cents a pound that the dealer mixes in to increase the profits of the mixture that he sells for twenty-five cents a pound.

But there is no better nut in the world than the kind of pecan to which thousands of acres are now being planted in the South and which most people in the North have never even seen.

ORIGIN OF NUT VARIETIES

And how were these splendid nuts obtained? Not by some plant wizard mysteriously evolving them by scientific processes, but simply by putting grafts from the best nut trees of the fields and forests into young trees in the nursery. This does not change the nuts at all. It simply perpetuates them as Nature created them. Each grafted nursery tree bears the same nut that the parent tree bore.



A TYPICAL ENGLISH WALNUT ORCHARD

This is the Vrooman Franquetta orchard, in Southern California. Great care and skilled attention is given such large orchards as these, and there are many of them in Southern California. They produce a very substantial annual profit for the owner.

Many people do not know that the only way we can grow any particular kind of fruit that we want is to graft buds from the original tree on other trees of similar kind in the orchard or nursery. All fruit trees that grow from seeds are new kinds. You can't grow a true Baldwin or Greening apple from seed. You must take the buds from a Baldwin or Greening tree and bud or graft them on another apple tree in orchard or nursery in order to get trees that will bear Baldwin or Greening apples. It is the same way with nut trees. You've got to bud or graft them to get the same nut that grows on the parent tree.

A man planted a thousand nuts from one genius pecan tree. Of the resulting trees no two bore nuts alike nor like those of the parent tree and none as good. This is because Nature isn't interested in growing things as man wants them. What she is after is seed and plenty of it. All trees grown from seed tend to revert to the common type that Nature has found most useful for her seed purposes. A genius tree, like a genius man, is a rare accident, and the children of geniuses are rarely geniuses.

We can't graft a human genius. If we could we might now have whole cities of Shakespeares, just as we have whole orchards of Baldwin apples. But we can graft genius trees and keep the characteristics practically unchanged, perhaps for centuries. So if you know of a genius nut tree it is your privilege and duty to have it perpetuated by grafting.

In the Old World, in California and in the pecan coun-



ENGLISH WALNUTS AS STREET TREES

Why, asks the author of this article, do people plant poplars, maples, willows, etc., as shade trees, when they could plant pecan, English walnut, hickory, chestnut, or black walnut for the same purpose, and at the same time get valuable crops from them?

try, they have passed through, or over, the seedling stage. All the trees they now set are grafted. But in the North some of our nurserymen are still in the seedling stage. Some of them must have cut their eye teeth, however, because they know enough to represent their seedling trees as grafted. But it is only the purchaser that is grafted. There is now no excuse for selling or setting seedling nut trees in the North any more than seedling apples or peaches.

A very large proportion of our native nut trees bear poor nuts. It is the exceptional tree that bears good crops every year of large nuts of good quality. These good nut trees are being lost from natural causes, or by the axe, every year and are not being replaced. Once gone a good tree is lost forever unless grafted on another tree.

PRODUCTIVE VALUE OF NUT TREES

The productive value of some nut trees is immense. A woman told me in Indiana that she sold \$90 worth of pecans at 15 cents a pound from one wild pecan tree. In 1910 Mr. John West of Monticello, Florida, sold 900 pounds of nuts from one seedling tree at 11 cents a pound and received a check of \$99 for them. Another pecan tree averaged \$90 a year for seven years in succession. A tree in Cairo, Ga., gave an annual average for three years of \$100. One such tree on an acre would return more money and more food value than all the wheat that could possibly be grown on it, and with hardly any labor. And the wheat can be grown there, just the same, even with three such trees to the acre.

Nut growing is destined to be a great industry and to furnish a substantial part of the food supply of the world in the centuries to come.

Nut trees give us our best timber. The oak, beech,

chestnut, hickory, butternut or white walnut, black walnut and Circassian or English walnut are among our most valuable woods.

Can anyone say why we do not use for shade trees, avenues and roadside planting, the pecan, hickory, black walnut, chestnut and English walnut? Why plant worthless poplars, soft maples, willows, ailanthus and other trees of little or no use except for shade, when we might have equally or more beautiful shade trees, combined with valuable productiveness? Suppose that our country roads were lined with fruit and nut trees and the products free to all? Would not that help solve the problem of food? A few bushels of nuts from your own dooryard trees, and a knowledge of how to use them in cooking, would lighten

the burden of the bread and meat winner.

How could a man get more permanent fence posts, never needing renewal or painting, and paying him in fruit for the privilege of working for him, than with a row of nut trees?



A NEW PECAN, A SEVEN-YEAR-OLD BABY

The up-to-date pecan planter now uses only grafted trees, because it is not possible to get satisfactory results in trees grown from seed. There is now no more excuse for setting seedling nut trees than seedling apples or peaches.

Every farmer ought to have nut trees on his place just as he has fruit trees. He ought to have different kinds of nuts, just as he has different kinds of apples, pears, plums and peaches. Moreover, he ought not to be contented with wild nut trees any more than he is contented with wild apple or plum trees. He can now have



A WONDERFUL PRODUCER

A pecan tree in Indiana. It was such a tree as this which recently produced \$90 worth of pecans at 15 cents a pound. Another averaged \$90 a year for seven successive years, while a third gave an average of \$100 for three years.

improved kinds of nuts of all varieties. He can begin by top working his native shagbarks and pignuts to choice shagbarks or pecans. His native black walnuts and butternuts can be changed into English walnut trees.

Everybody who has a place for a tree should set a grafted nut tree. Every owner of a village plot, or even of a city back yard, should have a nut tree. Never mind the ailanthus and poplar. Grow a tree that bears something to eat.

An infinite series of nut hybrids awaits the patient and long-lived experimenter. The best prophets predict the world almost living on wonderful new nuts five hundred years from now. Nature herself has already given us hints of the hybrid possibilities, though her chance results miss the mark that man's purposive efforts may be expected to attain.

Nut growing is only part of a new agriculture by which much of the food of man and his domestic animals shall be grown on trees, independent of many of the limiting conditions of sown crops, but permitting, under suitable conditions, companion cropping with sown or

planted crops. It must be built on the idea of permanence and assurance. It must include the ideas of intensive cultivation, of two and three story agriculture, and of growing legumes. On our arable land we shall grow nut trees, three or four to the acre, giving them their greatest possible development; between them we shall grow peanuts, beans and alfalfa; we shall keep some chickens, pigs, sheep and a cow, and be forever independent of the meatman.

Of our steep, rocky and untillable slopes millions of acres will be clothed with oaks, chestnuts and beeches, with persimmons, pawpaws, mulberries, honey locusts and sugar maples, binding the soil and conserving rainfall; and beneath them our droves of pigs, flocks of



AN INFANT OF TWO YEARS

This young and ambitious chestnut, just two years from a graft, is going into business for itself at an early age. Note the burrs. Many grafted nut trees bear sooner than apples.

sheep and herds of deer will find shade and water while harvesting their own food.

It is foolish to say, "I am too old to plant trees." Some of our most enthusiastic nut planters are octogenarians or better. Grafted nut trees bear as early or earlier than other fruit trees. The man who plants fruit and nut trees takes out a paid-up life insurance policy for himself and his children. And the man who plants trees and cares for them himself will disappoint his anxious heirs and live long to enjoy the fruits of his own planting.

There is hardly a thinking man or woman to whom there does not sometimes come the old instinct and longing to get back to nature and the land. Youth seeks the competition of life with others in the city, but mature years bring the desire for the peaceful life of the country. "The boy on the farm dreams of the day when he can be the president of a bank, have a home in the city, own an automobile, smoke good cigars and go to the show every night. The bank president dreams of the day when he can turn again to the farm and walk in the green fields, where he can shun the various artificial activities of city life, drink buttermilk and retire with the chickens."

For him, or for anyone, there is no more peace-giving occupation than horticulture and no more fascinating branch of horticulture than nut growing. Let him use his leisure time, whether it be much or little, in learning to bud and graft nut trees, in growing seedling almonds in the search for a hardy, thin-shelled variety, in experimenting with the pine nuts, in breeding blight-immune chestnuts and filberts. The solution of any one of these problems will be of immense value to the country. And let him produce some of the infinite series of hybrid nuts that lie within the probabilities of the future. No man can have a better hobby, that universal need, than nut growing.

BIRCH TREE SPLITS GRANITE BOULDER

THE roots of plants and trees play an important part in converting rocks into soil. All rocks have seams or cracks or eventually develop them through the action of rain, frost and sunshine. Into these cracks, however minute, the rootlets of small plants penetrate, carrying with them a little humus to decay and to be followed by other roots. Moisture follows which freezes and cracks off small rock particles, when larger roots find their way in, carrying more dirt. Through the course of many years the crack widens and deepens and becomes filled with drifting dirt, when perhaps a tree seed blows into it, and then the real process of rock splitting begins. The expansive force of a tree root is tremendous, and if the rock has a well-developed seam it is likely to be riven entirely asunder. As the rock breaks and chips and disintegrates, it contributes to the vigor of the plant, since rock particles contain the elements of plant food. Some rocks are cracked by roots much more easily than others, yet even granite boulders are sometimes riven by tree roots where the rock has been seamed and weakened by various disintegrating agents. The photograph shows a granite boulder in Maine being slowly split by a birch tree.

THE WILLOW INDUSTRY

FROM investigations carried on by The New York State College of Forestry at Syracuse in the basket willow growing section about Liverpool and Lyons in New York State and in the study of reports of basket manufacturers, it finds that the bulk of the willow ware



BIRCH SPLITS A BOULDER

Even Maine granite, hard as it is, cannot resist the expansive force of the roots of the birch shown in this picture.

used in the United States is manufactured in the little town of Liverpool just north of Syracuse. The Liverpool shops use over 3,000 tons of basket willow stock which is 75 per cent of the total stock used in the country.

About a year ago basket willow stock was bringing from \$20 to \$25 per ton delivered at the Liverpool factories. Today, owing to the cutting off of the foreign supply the prices average about \$30 a ton, and that in spite of the increased local production.

7,300 ACRES WITHDRAWN

UPON the recommendation of Secretaries Lane and Houston, the President recently signed an order excluding 7,300 acres from the Pike National Forest, in Colorado. Of this amount about 6,000 acres are vacant public lands subject to settlement under the homestead laws in advance of entry or other forms of disposition. Such lands will be subject to settlement from 9 o'clock a. m. March 31st until and including April 27, 1916, and thereafter to disposition under any public land law applicable thereto. The lands are located in the central part of Colorado in Park County, and are within the Leadville land district. They are non-contiguous tracts in the foothills lying along the exterior boundaries of the southwestern part of the National Forest, and are non-agricultural grazing lands.

Wood Preserving Department

CREOSOTED WOOD BLOCK PAVEMENT

By O. P. M. Goss

STATISTICS show that since 1908 the increase in the use of creosoted wood block in the United States has been very rapid. For example, in 1908, 1,260,000 cubic feet are reported to have been laid, which amount was increased to a total of 10,000,000 cubic feet in 1911. Recent years have shown even greater increases, 1914 alone approximating 4,800,000 cubic feet of wood block pavement.

The reason for the increased use of this type of pavement is very evident. Engineers and investigators have been working to perfect wood block construction and have made good progress. This type of pavement must be used with a full knowledge of the material or the results will not be satisfactory. There is probably no material which requires more careful study than wood block in order to secure the very best results. On the other hand, this material may be inspected as to quality, etc., with a greater degree of certainty than practically any other material. Due to this certainty of inspection it is possible with efficient supervision to secure a first-class job in construction. In other words, any defects in the wood may be readily detected by a visual test-making inspection of the simplest type.

As a result of experience with creosoted wood block in the United States it has shown such excellent qualities as to encourage a more thorough study of the subject with a view to correcting any objectionable points. Engineers of many cities are examining its many qualifications and collecting evidence of the experiences of other cities with it, with a view to its use in their own town.

The durability of wood block pavement has been abundantly demonstrated. There are many instances where creosoted wood block pavement has been down for

6 to 13 years with no appreciable maintenance cost. The following are specific examples:

Jamestown, N. Y., pavement down 10 years. Maintenance reported, "Very trifling."

Toledo, Ohio, pavement down 12 years. Maintenance reported, "Very little, if any."

Minneapolis, Minn., pavement down 13 years. Maintenance reported, "None."

Hamilton, Ont., pavement down six years. Maintenance reported, "Not one cent."

New York, N. Y., pavement down eleven years. Maintenance reported, "Not a cent."

Boston, Mass., pavement down nine years. Maintenance reported, "Total cost, two-tenths of a cent per square yard."

Records such as these from cities having large amounts of creosoted wood block pavement are very significant.

As a result of records such as shown above, some of the largest and most progressive cities in the United States laid large amounts of creosoted wood block pavement in 1914, as follows:



A CREOSOTED DOUGLAS FIR WOOD BLOCK PAVEMENT

This pavement in Seattle, Wash., shows but one-eighth inch wear after seven years' subjection to very heavy traffic. It is still in excellent condition, and wear has not occasioned one cent's worth of repair. Creosoted wood blocks are considered by experts to be the very highest type of pavement, giving maximum service and satisfaction at a minimum cost.

City	Sq. yds.
Cambridge, Mass	29,037
Meridian, Conn.	44,331
New Haven, Conn.	81,944
Rochester, N. Y.	30,390
Newark, N. J.	73,151
Philadelphia, Pa.	31,224
Cincinnati, Ohio	44,015
Chicago, Ill.	139,914
Minneapolis, Minn.	204,655
St. Paul, Minn.	269,969
Kansas City, Mo.	16,783
Houston, Texas	73,275

26,400 square yards of pavement is equivalent to 1 mile on a 45-foot street.

One of the most important details is the treatment of the blocks. Douglas fir is unlike most woods from the standpoint of impregnation, and it has been necessary to develop treating methods especially for this wood in order to get the results desired. Paving blocks of any wood should be treated in such a way as not to cause any appreciable loss in strength. The steaming process is not suitable for treating Douglas fir blocks since the fiber of this wood is injured by this treatment. The following method has been developed for treating blocks and has proven thoroughly satisfactory:

The blocks shall be placed in the treating retort, direct from the saw, and the preservative introduced and heated to approximately 215 degrees F. for from one to four hours. The preservative shall then be drained off and a vacuum of 23 to 26 inches drawn to take out the surplus vapors, etc., from the wood cells. The vacuum shall then be broken by the introduction again of the preservative, which is then pressed into the wood at a temperature of 180 degrees F. until the blocks have received from 16 to 18 pounds per cubic foot. After receiving the required amount of oil, the pressure shall be released, and the temperature of the oil gradually raised to 220 to 230 degrees F., and held for one hour. This final heating expands the oil and vapors within the wood, and causes a certain amount of the preservative to be expelled, due to this expansion, and also effects further seasoning of the wood. A final vacuum of 23 to 26 inches shall then be drawn, which dries the blocks of the surplus surface oil, leaving a thoroughly impregnated block which will never "bleed" after being placed in the street, since it is forced to do its "bleeding" during its treatment.

The above treatment produces an ideal block, which retains its original strength and is amply fitted to resist swelling and decay.

CONSTRUCTION DETAILS

In general, the following details of construction should give the best results in building a wood block pavement:

Blocks should be cut from sound, strong, close-grained lumber and accurately dressed. Variations in thickness and depth should not exceed 1/16 inch. They should be creosoted in accordance with the method above referred to, and 10 to 12 pounds of oil per cubic foot left in the wood. The blocks should be placed upon a smoothly finished concrete base, painted with pitch or asphalt immediately before blocks are laid. The painting should be thorough, and a bond secured between the paint coat and the concrete.

Blocks should be laid in courses at an angle of 60 to 67 degrees with the curb and with as close joints as possible. The lower portion of the joints should then be filled with very hot asphalt or pitch sufficiently fluxed to enable it to flow into the joints. The upper portion of the joints should be filled with hot, dry sand, and the entire surface rolled with a 10 to 14 ton roller to thoroughly seat the blocks and to finish completely filling the joints with sand. Liberal expansion joints should be provided along each curb. The lower half should be filled with bituminous filler and the upper half with clay. Fine gravel, one quarter to half an inch in diameter, should be scattered over the surface and rolled into the

blocks until a surface satisfactory to the engineer is secured. A coat of fine sand should be spread over the surface of the pavement and left for thirty days after street is opened to traffic. Additional fine gravel coatings may, if desirable, be spread on the surface from time to time.

Douglas fir has thoroughly demonstrated its ability to withstand the wear found on business streets. Almost seven years ago a portion of Fourth Avenue, Seattle, was paved with creosoted Douglas fir blocks. This street is today in excellent condition, as shown by the accompanying photograph, and the city has had no maintenance



TWO WOOD PAVING BLOCKS

These blocks, one Douglas fir and the other Longleaf pine, are from Sections 7 and 8 of the Minneapolis Test Pavement and both have been under the same street conditions of heavy traffic for four years. The wear is practically the same on both woods.

to pay. The wear on the blocks has been approximately 1/16 inch, and more than 3,300 vehicles daily pass over this pavement.

Eleven years ago Douglas fir blocks were laid on Salmon Street, in Portland, Oregon. The city records indicate that the maintenance has been less than one-quarter cent per square yard per year. The wear on the blocks is practically nothing. The blocks were not properly treated.

There has been a great deal said regarding the value of Douglas fir as a paving wood. Examples, as shown above, indicate the ability of this wood to resist mechanical wear.

Four years ago Sections 7 and 8 of the Minneapolis test pavement on Nicollet Avenue were laid with Douglas fir and Longleaf pine blocks. This pavement is subjected to very heavy traffic and both sections are at the present time in first-class condition. There is no indication from the condition of the pavement that two woods were used.

C. S. JUDD HONORED

Forester C. S. Judd has recently been appointed by Governor Pinkham, of Hawaii, as chairman of the Conservation Commission of Hawaii.

Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

EDITED BY J. J. LEVISON, B.A., M.F.

ECONOMIC VALUE OF SHADE TREES

BY WILLIAM W. COLTON, B.S.

HOW are we to determine the value of our individual shade tree?

It is generally admitted that shade trees are valuable not only from an economic standpoint, but also from their aesthetic, historic and physical properties, but as my purpose is to show that there must be some definite method of determining their value, I am going to consider only the economic value.

The development of a street requires the removal of a tree at a certain point. Mr. A. says he wouldn't have that tree removed for \$1,000. Would it damage his property to that extent? Would he pay that amount for replacing it? On what does he base his estimate of value?

A private corporation or individual damages a tree in such a manner that it dies. Mr. B. brings suit and claims damages of \$500 or \$1,000. The court allows him perhaps (?) \$150.

A city or town has a row of trees killed by gas. The gas company is sued, and here again the court awards an arbitrary figure of perhaps \$100 per tree, doubtless altogether regardless of size, species, or condition. What method is used in determining these valuations? Up to the present time there have been a number of methods used.

First, the arbitrary method; as for instance, in Massachusetts, where a State law formerly gave the court the privilege of placing a fine of not less than \$5, nor more than \$150, on a person found guilty of destroying a tree. This left it optional with the judge as to how much it should be. In New York State the court has established

a record by handing down a verdict of \$500 apiece for the destruction of a row of trees by a construction company. In some cases an arbitrary value has been placed on the tree by means of its diameter, as for instance,

\$2.00 per inch; that is, a tree 18 inches in diameter would be worth \$36.00.

Second, the replacement value, under which would come such cases as are settled on a basis of the cost of replacement.

Third, is the method of placing an arbitrary value per square inch of basal area taken at breast height, or $4\frac{1}{2}$ feet from the ground. The usual figure used in this case is \$1.00. This is used principally because it is easy to figure with. In this case a tree 18 inches in diameter having a basal area of 254.47 square inches, would be considered worth \$254.47. This is rather different from the first example and obviously quite as much too large, for an average case, as the first is too small.

The fourth, called Parker's method, is a variation of the above. In this case \$1.00 per square inch of basal area is allowed, but a reduction is made for position, species, truck condition, top condition, and general desirability, scenic value, etc. Twenty per cent is allowed for each of

five heads when perfect. An optional reduction is made for defects and the resultant figures added together and multiplied into the basal area valuation. This is by far the best of any system that has yet been advocated. It, however, has certain defects, as it tends to give too high a value to certain species.

For a number of years I have given much attention

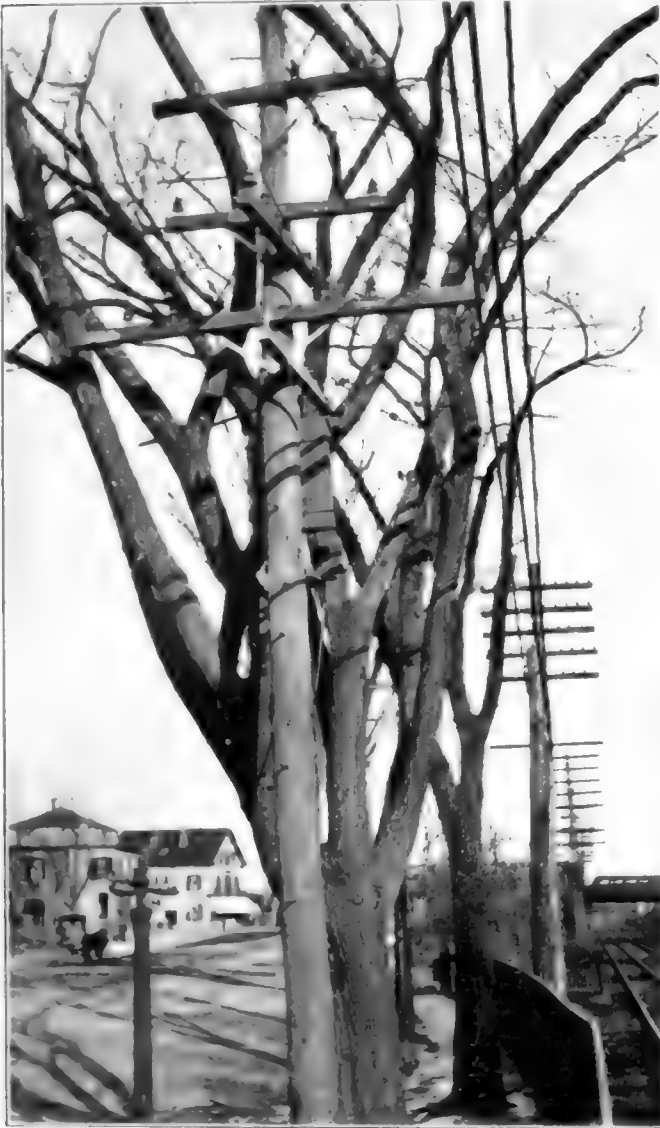


VALUE DEPRECIATED \$230.91

This beautiful American elm would, if perfect, be worth \$323.27, according to the calculations of City Forester W. W. Colton, but it has been so badly damaged by the ravages of the Leopard Moth that under the Deduction Factor System its value is only \$92.36.

to a study of the valuation of trees and am convinced that some standard of valuation should be adopted.

In analyzing the various methods now in use it seems that the most accurate way of estimating the value of a tree is by means of its basal area, as this is the best graphic indication of the tree's size of crown, which, after all, is the real valuable part of the shade tree.



DAMAGED ELM, VALUE \$142.53

If this was not injured by the high tension electric wires it would be worth, so City Forester W. W. Colton estimates, \$199.56.

No accurate basal area factor can be derived that will be equally valuable for all species. It becomes apparent then that we must first obtain a value per square inch for basal area that has some definite foundation, and then arrange a sliding scale of deduction factors for various species, according to their specie value, that is, rate of growth and resistance to insects, disease, climate and present physical condition.

To obtain the first, the sugar maple was selected as the standard species, because it has been more commonly planted in the past fifty years than any other tree, and has the most available data in regard to it. In order to be able to apply the same to the basal area, we had to determine the amount of money invested

in growing a tree to a diameter that would produce that basal area. This includes the original cost of the tree, its planting and maintenance. By using the best available figures for a sugar maple, we found that the average value per square inch of basal area at the end of fifty years is 64½ cents. This is the value for an ideal tree under perfect conditions.

The next step was to obtain a scale of reduction factors for species and condition. It is evident that by the use of this method the value placed on a 12-inch fast growing tree would be the same as on a 12-inch slow growing tree, whereas the actual value of the slow grown tree would be much more. For instance, from a standpoint of interest



IMPERFECT ELM, VALUE \$51.96

The high tension electric wire passing through the branches of this tree has seriously impaired its value and will still further injure it. If it was in perfect condition it would be worth \$181.54.

on investment and maintenance, a 12-inch beech would be worth very much more than a 12-inch poplar.

To obtain a deduction factor, the most common species were divided into five classes, according to their rate of growth, and a proportional deduction made for each class.

As all trees are not equally valuable on account of their susceptibility to insects and diseases, they were again divided into five classes and the same deductions made.

One more reduction factor was necessary to complete the list, that for the present physical condition of the

tree. To obtain this a reduction was made for the condition of the top and trunk, and the resulting figure used as the factor.

By applying the factors, obtained from the above deductions, to all common species of shade trees, we found that the sugar maple was 15 per cent below a perfect tree. Therefore, if the value of a sugar maple was 64½ cents per square inch of cross-section, the value of a perfect tree, or a standard value, would be 75 cents.

A table has been prepared, using 75 cents as the value per square inch of basal area for a perfect tree, and showing the proper deduction factors for all species of shade trees. This table is being used by this office in obtaining values, and has been found very satisfactory.

There is one point in the discussion of the value of a shade tree which has not been touched upon in this article, and that is "location." Viewed from some angles, this is a very important point. From the fact, however, that there is such a chance for diversity of opinion as to the proper and improper location of a shade tree, I have purposely neglected to take this into consideration in my factors for deductions. The opportunities for deductions of all kinds are so great, and the possibility of arriving at any definite figure for abatement so uncertain, that it has seemed best to eliminate this factor entirely. It is my belief that this deduction can safely be neglected, unless the tree is most obviously out of its proper location. If, as stated above, there can be no question about its improper location, then the party or parties judging the value should make some arbitrary reduction from the value placed on the tree by the prepared tables.

As a concrete example of the usefulness of some set value for shade trees, we have established an approximate value for all the street trees of Newton, Massachusetts.

In the summary of data gathered from the shade tree census, we have grouped all our trees by species, diameter classes and conditions. For instance: Sugar maple, 1/6-inch; 7/12-inch, etc., and either Good, Fair or Poor condition.

Species.	No. of trees.	Value.
Sugar Maple.....	6,531	\$612,851.00
American Elm.....	2,471	417,867.00
Norway Maple.....	1,130	98,737.00
White Ash.....	382	85,112.00
Red Maple.....	480	72,324.00
White Maple.....	355	40,206.00
All other species.....	1,228	189,505.00
Total valuation.....	12,577	\$1,516,602.00



NORWAY MAPLE WORTH \$63.61

A perfect specimen twelve inches in diameter, the value of which has been calculated upon the basis described by City Forester W. W. Colton.

To obtain an approximate value for these, we have eliminated those classed as Poor altogether, and then based our calculations on an average valuation for trees in each diameter class. The average value was then reduced for species and the resulting value applied to the number of Good and Fair trees of each species in each diameter class, with the above result.

This is discounting entirely 2,320 trees classed as Poor, which would, of course, have some value.

It can readily be seen that with a permanent value established, the above figures are of unmistakable assistance to a City Forester or Arborist in convincing the City Government or Town Fathers that it is a good investment for them to appropriate a sufficient sum of money to properly care for these trees.

AN EXHIBIT OF TREES

An exhibit of ornamental and shade tree work in public parks and on private estates will be held under

the auspices of the Conservation Department of the General Federation of Women's Clubs, on May 24th, at the Seventh Regiment Armory, New York City. The Ornamental and Shade Tree Department of American Forestry has been appealed to for its cooperation, and is now organizing a general campaign of cooperation, enlisting shade and park commissions, city foresters and others willing to cooperate. All communications for further details may be sent to the Editor of AMERICAN FORESTRY, or to Miss Mira L. Dock, chairman of the Forestry Committee of the General Federation of Women's Clubs, Fayetteville, Pennsylvania. Promises for good exhibits

have already come in, and those interested should write at once. The American Academy of Arborists, at its last meeting in Newark, expressed its interest in the exhibit, and many of its members have already started to work on it.

AMERICAN ACADEMY OF ARBORISTS MEET

The first annual convention of the American Academy of Arborists was held on January 28th, at the City Hall in Newark, N. J. It was a successful meeting, attended by most of the representative arborists of the country. The discussions of the members proved beyond doubt that the work of the trained and experienced arborists is a highly professional work, and that the Academy is determined to place the profession on the highest possible basis.

The city of Newark had much to show in arboricultural work, and the Mayor, the Shade Tree Commissioners, and the Board of Tree Commissioners showed what Newark could do as a host. Those who gave special lectures were Messrs. Carl Bannwart, Secretary of the Newark Shade Tree Commission, on "The Ministry of Trees;" Hermann W. Merkel, Chief Forester, New York Zoological Park, on "The Tree Fakir;" J. J. Levison, of the Brooklyn Park Department, on "Arboriculture as a Profession," and R. Brooke Maxwell, City Forester of Baltimore, Maryland, on "Fungus Problems of Interest to Arborists." The old officers were re-elected, with Hermann W. Merkel, Zoological Park, New York City, as President, and J. L. Levison, Brooklyn Park Department, as Secretary. The Academy had to refuse membership to quite a number of candidates, but elected the following eight Fellows and one honorary member:

George H. Hollister, Assistant Superintendent of Parks, Park Department, Hartford, Conn.; Dr. George Stone, Amherst University, Amherst, Mass.; Ernest F. Braunton, City Forester, Los Angeles, Cal.; William J. Coleman, Forester, Shade Tree Commission, Newark, N. J.; Albert R. Robson, Forester, Bronx Parkway Commission, Pennsylvania Avenue, Chestwood, N. Y.; Allan Oakley Smith, City Forester, 70 Valentine Street, Mt. Vernon, N. Y.; John A. Anderson, Forester and Secretary, Shade Tree Commission, Montclair, N. J.; Harry J. Mueller, City Forester, Harrisburg, Pa. Honorary member, Carl Bannwart, Secretary, Shade Tree Commission, Newark, N. J.

"AMERICAN FORESTRY" THE OFFICIAL ORGAN

The American Academy of Arborists, at its recent meeting in Newark, N. J., chose AMERICAN FORESTRY as its official medium for expressing its sentiments and experiences in behalf of arboriculture. There is no doubt but that what the American Academy of Arborists, collectively or individually, will say, will be worth saying, and with absolute confidence in the professional standing of its members, AMERICAN FORESTRY feels highly honored and pleased to open its pages in cooperation for the uplift of professional arboriculture.

ADVICE FOR FEBRUARY

1. Remove and burn all hopelessly infested trees.
2. Clean up the heavy brush in the woodlands and burn while the snow is on the ground.
3. Thoroughly dig out all decayed wounds and cover the surface with coal tar.
4. Collect and burn the egg masses of the white marked Tussock moth and destroy eggs and cocoons of other insect pests.
5. Prune fruit trees, removing all dead wood and heading in the tops, so as to form low heads.
6. Spray fruit trees for sucking insects and canker. Determine beforehand what you are spraying for and then use chemicals and methods in accordance with the particular pest you are spraying for. Choose a fine, mild day for this work.
7. Inspect all pear trees for fire blight and cut out and tar all cankers from main branches and trunk.
8. Cut out black knot from plum and cherry trees.
9. Prune and tie up grape vines.
10. Cover with coal tar all old wounds and scars on trees.

QUESTIONS AND ANSWERS

Q. What can be done to protect the hickory trees now dying in great numbers in the vicinity of Baltimore? I have several around my house and two died last summer. Is it true that their death is due to a small insect which invades the bark and girdles the tree? J. H., *Baltimore, Maryland.*

A. It is true that death of large numbers of hickory trees in this vicinity is due to a small beetle which invades the inner bark and girdles the tree. The remedy consists in locating the infested wood and removing and burning it before May, the time the mature beetles emerge. On page 797 of the July issue of AMERICAN FORESTRY you will find an article describing this insect and how to eradicate it.

Q. Am sending specimen dead cuttings of mountain ash and would appreciate your advice and information. The tree is about six to eight inches in diameter, 25 feet tall, has not borne any fruit last season and very little the year before. The bark shows discolorations and both large and small branches are dying off. Could the trouble have originated because a few scars had not been painted over where a few branches were removed? Is mountain ash a very hardy tree in this latitude? O. A. K., *Grand Rapids, Mich.*

A. From the specimens submitted it looks as if the round-headed apple borer or some other borer has attacked the tree. Please look for borers. I doubt whether the scars had anything to do with the trouble. The mountain ash is not a very hardy tree in the east, is often attacked by borers and scale insects and when it once starts going backward it is very difficult to save it.

Q. Shall appreciate your advice as to the best time and most desirable spray to use for the oyster scale. A very interesting case has arisen here and we are considering hiring a man to spray for this pest now, in January, but it is my personal belief that it is better to do this in the spring and that winter spraying is not so effective. W. W. M., *Rogers Park, Ill.*

A. The oyster-shell scale may be controlled by applications in the Spring, the middle part of May or later, of a contact insecticide such as kerosene emulsion or whale-oil-soap solution, making the application when the crawling young are most abundant. Systematic spraying with lime-sulphur wash, that is, annual applications, will help considerably to keep this pest under control, though for a serious outbreak you will do better by waiting until spring, as described above.

Q. How is it possible to protect beech trees from parasites that infect the leaves? They are found on the undersurface and cause the leaves to wrinkle and curl up and eventually to become yellow and die. J. H., *Baltimore, Md.*

A. You can readily destroy these soft-bodied sucking insects by spraying the under side of the leaves at the time the insects appear with a whale-oil-soap solution at the rate of one pound of whale-oil soap to 5 gallons of water.

ORNAMENTAL TREE WORK IN CHINA

Mr. Chang is a graduate of the Yale Forest School and has gone back to interest his people in the planting of parks and streets. He writes as follows:

"Some time ago your welcome letter with a separate parcel of pictures and literature came to me. Thank you very much for them. I have been reading *AMERICAN FORESTRY* and like your articles and advices very much, for they often give me just what I want.

"Our mission has two pieces of land, one 30 acres, where the college campus will be, and not far from the city, and the other 28 acres, more or less, on a hillside about four or five miles away from the city. The latitude here is about that of Florida, except inland. The soil is bottom land, with surface soil of fine loam and subsoil of clay. What kinds of trees are best as shade trees for the campus and as an experiment station for the other? At present both pieces are treeless. My suggestions are: To plant as many willows as possible for the time being, especially on the campus. To try to get some young trees of ginko, plane, locust, Uku tung (*aleurites cordata*) a very hardy and shady tree, for the immediate planting. To establish a small nursery on the property for replacing the willows and planting the rest.

"How do you treat the ginko seeds before sowing? The seed, or fruit, is a little smaller than an olive, with a hard, limy cover and meat within."

A. You certainly do have an excellent opportunity to bring this new phase of arboriculture and ornamental tree planting before your people, and we would be very anxious to cooperate with you from time to time and offer you all the suggestions we possibly can. Your idea

of planting willows, etc., for immediate effect and inter-planting trees of a more permanent character is a very good one. Your selection of species is all right except that I would like to suggest the addition of many more varieties both for the sake of experiment and for the sake of change of color and character. I am not familiar enough with your conditions to dare give you an absolute list of what you should plant, but it seems to me that several of the oaks, beeches, the pines, the hackberry, the birches, the tulip tree, sweet gum, magnolias, the elms, the catalpas, the native Wu tung, or Chinese National Tree. Would not recommend the aleurites, or wood oil tree for shade planting; and some of the smaller ornamental trees and shrubs should be represented. If you cannot use them all in your permanent plantations, I would suggest that you at least put them in a nursery for future use.

As to the treatment of the ginko seeds before sowing, I found the same difficulty that you have experienced, and obtained good results by filing the edges of the seed a little before putting them in the ground. That prepares the seed for easy breaking and germination.

MONUMENT TO A TREE

PERHAPS one of the most curious monuments in existence has recently been built in Ontario by Canadians, says *The Popular Science Monthly*. The farmers have just erected a marble pillar to mark the site on which grew a famous apple tree.

More than a century ago a settler in Canada named McIntosh, when clearing a space in which to make a home in the wilderness, discovered among a number of wild apple trees one which bore fruit so well that he cultivated it and named it McIntosh Red.

The apple became famous; seeds and cuttings were distributed to all parts of Canada, so that now the McIntosh Red flourishes wherever apples grow in the great Dominion. In 1896 the original tree from which the enormous family sprang was injured by fire, but it continued to bear fruit until five years ago. Then, after 15 years, it died, and the grateful farmers have raised a marble pillar in honor of the tree which did so much for the fruit-growing industry of their land.

The story of this apple tree illustrates the African proverb that, though you can count the apples on one tree, you can never count the trees in one apple.

FORESTRY ESSAY CONTEST

IN an effort to stimulate interest in forestry and in the conservation of forest resources, the Indiana State Board of Forestry has announced prizes, to be competed for by the school children of the State, for an essay on "A Plan for the Beautifying of the School Grounds by Planting Trees and Shrubs." The first prize will be \$12.50 and the second, \$7.50 in cash, to be given to the successful contestants in the high schools of the State, and prizes of the same amounts will also be awarded the grade and country school writers of the best essays.

Editorial

PUBLIC PLAYGROUNDS THREATENED

IN an editorial published in February, last year, we called attention to a peculiarly vicious bill introduced in the last session of Congress, whose purpose was to rob the people of the West of their title to, and free use of lake shores, camping sites and summer recreation spots, by permitting these lands to be acquired in perpetuity by private owners. Failing of passage at that time, this bill has now been reintroduced and is known as Senate Bill 1065, and House Bill 349, which are identical. The bill provides that any citizen over 20 years of age may file on public lands, whether or not they are part of a National Forest, and acquire absolute title within three years by merely spending a two months' summer vacation each year on the property and investing at least \$300 in improvements. The area which one person can so acquire is ten acres.

The area of National Forests is some 160,000,000 acres. Throughout this great domain the acreage of lake and stream frontage suitable for summer camps is probably but a small fraction of one per cent. Water is the one indispensable accessory to the summer camp or home. These portions of the public playground are more valuable to the people for this purpose than all the remaining area put together. They are the jewels of the public domain.

Under this bill these choice spots could be rapidly filched from the public and "no trespass" signs would forever bar us and our children's children from the enjoyment of lake and stream, except through the medium of the "resort," acquired by the enterprising locator at points of vantage and developed to exploit the seekers for outdoor recreation.

But it may be asked: Have not all of us an equal chance to secure a choice bit of land of our own, and should not these public lands be given to those who can use them? This is the old doctrine of private appropriation appearing this time in bold defiance of the most widely accepted of all public policies—that parks are for the people at large and that private encroachment will not be per-

mitted. As well say that the Yosemite and Yellowstone should be dealt out piecemeal to the most agile applicants as to permit this grab of the remaining public pleasure spots on the National Forests.

But there is this distinction—while the National Parks are kept wholly for the transient tourist and camper, the National Forests may legitimately be opened to the summer resident who wishes to live in a house of his own construction, and this can be done without parting with the title to land or interfering with the rights of the camper. By a law passed in 1915, leases of land for thirty years for this purpose are permitted on National Forests. The size of the area is determined by local factors. Wherever they are needed, areas are set aside solely for camping sites, and withheld from leasing. Under this law, in one locality 581 summer homes have been built on an area of 129 acres.

By contrast, under the proposed bill, thirteen persons could acquire the entire area and either expel or lease to the remaining 568 occupants. By the terms of this contemplated measure no one could acquire title to land who was unable to spend at least two months each year upon his homestead—and as there is no possibility of developing an agricultural living on such small areas, this would mean the practical exclusion of all but those of abundant means who can afford a vacation of this length. Furthermore, this law would sanction the acquisition of land anywhere on a National Forest, for any purpose whatever, whether it be for the establishment of undesirable resorts or the blocking of some point of outlet for timber, and no questions may be asked. Two months' residence each year for three years and a payment of \$1.25 per acre secures title.

The sponsors of such legislation may be deceived as to its character and purpose, but the public is keenly alive to dangers threatening possessions so highly prized. The American Forestry Association hangs out the danger signal, and the inscription, equally legible to legislators and to land grabbers, reads "Hands off."

The Weeks Law Hearing

OFFICERS of the American Forestry Association, representatives of other forestry and conservation organizations, and delegates from most of the New England and Southern Appalachian States, appeared before the Agricultural Committee of the House at Washington, January 28, and for three hours presented arguments in favor of extending the appropriation for the purchase of forest lands for the protection of the

headwaters of navigable streams under the provisions of the Weeks law. The committee was deeply interested, and each member asked a number of questions relative to work done under the Weeks law in the past five years, and the necessity for continuing the purchase.

The presentation of arguments was directed by Percival S. Ridsdale, executive secretary of the American Forestry Association, and Governor Locke Craig, of

South Carolina, presented the speakers and summed up the situation at the close of the hearing in an eloquent and forceful address in favor of the proposed measure.

There was submitted for the consideration of the committee an amendment to the Agricultural Appropriation bill, providing that two million dollars a year, for the next five years, shall be provided for the purpose of continuing the purchase of forest lands, and a sum, not exceeding \$25,000, to pay the necessary expenses of the Forest Reservation Commission.

The arguments were presented by Henry S. Graves, chief forester of the United States; William L. Hall, in charge of the the Weeks law operation for the Forest Service; George Otis Smith, director of the Geological Survey; Senators John W. Weeks, of Massachusetts, after whom the original bill was named; Allen Hollis, representing the State of New Hampshire, the Society for the Protection of New Hampshire Forests; and the Connecticut Valley Water Ways Association; Hon. Harvey N. Shepard, of Massachusetts, representing the Appalachian Mountain Club; George S. Powell, of Asheville, N. C., representing the Appalachian Park Association; Harold M. Parker, chairman of the Massachusetts Forestry Commission, representing the State of Massachusetts and Governor McCall; I. C. Williams, deputy forestry commission of Pennsylvania, representing Governor Brumbaugh; John S. Ames, of Boston, representing the American Forestry Association; Frank M. West, of Springfield, Mass., representing the Western New

England Chamber of Commerce, and W. O. Filley, of New Haven, Conn., representing the State.

There was a large attendance at the hearing, many members of the Senate and House, who had been requested by various State bodies to represent them, spending some time listening to the arguments; and a large number of delegates whom there was not time to formally hear, whose names and whose authorization to attend were later presented to the committee for its records.

Besides those mentioned there were present, among others, the following:

H. C. Bryant, New Haven, Conn.; Philip W. Ayres, Society for the Protection of New Hampshire Forests; Allen Chamberlain, Massachusetts Forestry Association and Society for the Protection of New Hampshire Forests; E. C. Hirst, State Forester of New Hampshire, representing the New Hampshire Forestry Commission and the New Hampshire State Board of Trade; W. H. Plummer, Director Asheville (N. C.) Board of Trade; Dr. Joseph Hyde Pratt, Chapel Hill, N. C.; A. E. Tate, High Point, N. C.; Fred Tate, High Point, N. C.; C. C. Smoot, North Wilkesboro, N. C.; H. E. Fries, Winston-Salem, N. C.; Julius C. Martin, Asheville (N. C.) Board of Trade; Mr. DeBlanc, Agricultural and Commercial Association, Riedsville, N. C.; J. W. Haynes, Buncombe County, N. C.; D. Hiden Ramsey, Asheville, N. C.; J. C. Smoot, North Carolina Forestry Association, North Wilkesboro, N. C.; W. M. Goodman, Knoxville, Tenn., Board of Commerce; Porter H. Dale, representing the Greater Vermont Association.

War's Effect on Trees

By F. McVICKAR

Mr. McVickar is a well-known Canadian forester, who enlisted with the Canadian contingent, was assigned to the cavalry arm of the service, and has been serving for some time in the British line in Northern France. He is not permitted to publicly announce the name of his troop nor the place it is located.—Editor.

I AM sending all I could scrape up about the effects of war on forests during the two months I was in France. In the army on service a man's time is never his own, and his movements are also very much restricted. Also when in the areas affected one is generally as close to mother earth as he can get during daylight hours; and consequently one's horizon is very circumscribed, especially in a very flat country.

"The sound of flying bullets and the burst of shells too tends to keep one's mind occupied with problems which at ordinary times are more interesting to woodchucks, badgers and the like than to foresters. However, now that everybody is talking of the war, and thinking of the war above all else, my little effort may not be entirely unwelcome.

"Unfortunately the country in which our force is operating is almost devoid of woodland. However, farther south in Alsace and Lorraine, there are extensive forests, but of course I couldn't get near them. Photos are absolutely out of the question. Cameras are not allowed out there to any except a few generals, etc.

"I have been in the trenches in Northern France; and although I didn't see enough of the effect of military operations on forest land to warrant venturing on anything like a technical discussion of the subject, a few of my impressions of this side of warfare may not be entirely amiss. First, I would like to say that while these operations are going on it is pretty nearly impossible to make any observations of value on this subject. This, I hope, will be made clear in the remarks which follow.

"The part of the line held by the British runs through a very low, flat country largely taken up by farming. It boasts of nothing but small patches of wood scattered about here and there.

"The operations that have taken place on this territory may be grouped under two heads; the first heading covering those operations incident to the advance toward Paris at the beginning of the war, and the second covering the almost stationary siege warfare of the present stage of the war.

"The damage caused by the first-class of operations is very slight in this part of the country. Chiefly because

the patches of wood are isolated and because owing to the general scarcity of wood litter and dead branches are kept cleaned up. Consequently the woods are not easily burned. Also at that stage of the struggle bodies of men moved largely along the roads, and artillery fire was not of long enough duration in one place to do much damage. Earthworks then were not very elaborate and poles were not used so much in their construction as at present.

"The effect of the operations coming under the second head are much more noticeable for the simple reason that the fighting has for many months been confined to a rather narrow strip of country.

"One might subdivide this area into two zones: the zone of constant bombardment, that is the zone of the trenches where there is an almost constant hail of shells and the zone of intermittent bombardment, this being the territory where the local range heavy guns drop a shell now and then, searching for the opposing artillery or sweeping the roads in search of transports or columns of troops.

"On the areas covered by the constant fire there are no living trees or even large shrubs left; in fact I've seen small patches where it seems that even the grass blades must be pretty well frayed out. Here, naturally in daytime, one keeps down in the trenches as much as possible, and in the dark one is too busy perfecting and repairing one's particular portion of trench to look around very much.

"However, by peeping out very cautiously in the daytime one may get an occasional glimpse of what used to be a patch of woods or a few isolated trees.

All species look pretty much the same now; a stub more or less split up, with one or more bits of broken branches still clinging on near the top. There are no leaves, twigs, or small branches remaining, and even most of the bark has been whipped off by flying metal.

"The earth is generally broken up and pitted very generously with shell craters. Now the explosion of a good many of these shells, for instance those containing lyddite, generates fumes which stain everything in the immediate vicinity; sand bags, clothes, and the very earth itself. As far as I could make out these fumes constantly settling on the soil will kill, or at any rate damage, its vegetation, and probably will reduce its fertility, for a time at least. However, when the war is over our French and Belgian friends will be able to tell us all about this.

"As to the effect of the gas on the soil, I have never been in the gassed country, so do not know much about it. They say that it kills the leaves on trees and shrubs.

"The long range bombardment of the second class doesn't do any appreciable damage to woodlands because the shells do not cover much of the ground and are generally dropped on other things than trees.

"A good many poles are taken from this area immediately behind the trenches for use in earthworks. This undoubtedly takes a good deal of material from the future yield of the stands. However, owing to the great

size of the area they are removed from the removal is not very noticeable in any particular spot.

When the time of reconstruction comes there will be an increased demand for timber for a time. All buildings, although in Europe largely made of brick or stone, require some wood in their construction. Most of the buildings close to the scene of the present operations will have to be completely rebuilt. Wood goes into railway construction, and a great many public works; all of which have suffered very heavily wherever near the trenches.

"Hence we will not only have damaged forests on the areas affected, but also a need for timber which for some time will be much greater than before the war."

SOCIETY OF AMERICAN FORESTERS' MEETING

THE annual meeting of the Society of American Foresters was held in Washington, D. C., on January 22. In addition to the usual reports of the retiring officers and committees, several matters of special importance to the Society were thoroughly discussed at the two business sessions. Chief among these were the questions of membership and the amalgamation of the Proceedings of the Society of American Foresters and the Forestry Quarterly. The general policy of such an amalgamation was endorsed by the meeting and the Executive Committee instructed to work out the details in cooperation with Dr. Fernow, editor-in-chief of the FORESTRY QUARTERLY. On the subject of membership the meeting expressed itself as in favor of the creation of a new class of Junior members, to be composed of professional foresters, whose achievements were not sufficient to make them eligible for active membership. This question was also referred to the Executive Committee for further consideration and for reference to letter ballot by the entire Society. Much other business was transacted, including the approval of the establishment of a section of the Society in Washington, and of the general policy of holding meetings of the Society in connection with the annual winter meeting of the American Association for the Advancement of Science, with which the Society is already affiliated.

The election of officers for the ensuing year was announced as follows: President, B. E. Fernow; Vice-President, E. H. Clapp; Secretary, Findley Burns; Treasurer, S. T. Dana; Executive Committee, W. B. Greeley (5-year term); R. C. Bryant (4-year term); Clyde Leavitt (3-year term); D. T. Mason (2-year term); F. A. Silcox (1-year term).

An open meeting of the Society was held in the afternoon of January 22, at which papers were presented by Dr. B. E. Fernow on "The Possibilities of Silviculture in America," and by Dr. Cristobal Hicken on "Vegetation Zones of Argentine and Adjoining Regions."

In the evening a well-attended smoker was held at the University Club, at which a number of informal talks were given.

The Annual Meeting

MORE members attended the annual meeting of the American Forestry Association held at the Copley-Plaza Hotel in Boston on January 17 and 18 than ever were present at any previous meeting. From every State in New England and the Southern Appalachian section, from the Atlantic States, the Northern and many of the Middle Western States they came, and spent two days hearing papers and addresses devoted to many phases of forestry, and attending a joint forestry dinner at which the guests of honor were Governor Samuel W. McCall, of Massachusetts, and Dr. Charles W. Eliot, President-Emeritus of Harvard University. It was a most successful meeting in every way, productive of a great deal of enthusiasm in the cause of forest conservation; of practical results, in action taken for the furtherance of the movement, and of publicity, which carried to the knowledge of thousands upon thousands of people the fact that the Association is a powerful national force in educating the people regarding tree and forest conditions.

President Henry S. Drinker presided at the opening session and in his address said:

"Friends of Forestry in New England who have graced our meeting with their presence: May I say on behalf of the American Forestry Association that our Directors gladly responded to the cordial invitation extended by the forest lovers of New England to the American Forestry Association to hold this, its annual meeting, in Boston? The New England States undoubtedly constitute distinctively the group of States that in the past have shown most interest in forestry, and who have done most, as a group, to forward the study and practice of sound principles of forestry looking to the proper care and reproduction of our woods, and the preservation of those of our forests which should be preserved for their scenic value. Those of us who come to you from Pennsylvania—the 'Keystone State'—from Penn's wooded State—can justly feel pride in our record of a State Forestry Association dating from 1886, an organized State Forestry Reservation Commission dating from 1893, and of pioneer efforts in the establishment of State Forest Reserves that have now grown into an estate of over one million acres of State lands set aside for the practice of forestry, exceeded in area only by the great Adirondack Reserves of the Empire State of New York, which, however, by the recent fiat of the citizens of New York in the rejection of their proposed new constitution (which would have sanctioned modern forestry practice), seem to be destined to continue to serve rather as a pleasure ground for the hunter and the fisherman and the lover of woodland life, than as a forest reserve proper.

"We congratulate you on your well-organized and active Associations for the promotion of forestry—among them

prominently the Massachusetts Forestry Association, the Association for the Protection of New Hampshire Forests, the Connecticut Forestry Association and the Maine Forestry Association—in the formation of which latter the American Forestry Association was privileged to exercise a sympathetic part and interest.

"One of the greatest measures enacted by Congress in recent years, the Weeks Law for the establishment of the Appalachian Reserve, extending from New Hampshire through the Eastern States to Georgia, bears the name of your distinguished Senator and your New England foresters, led in the movement by our able and most energetic friend, Philip W. Ayres, of the New Hampshire Association, are now cooperating with the American Forestry Association and with many bodies of leading and distinguished citizens of the Atlantic States in the effort to procure the enactment of such an extension of the Weeks Law as shall enable the good work so far done in procuring and setting aside an Appalachian forest reserve to be carried on and perfected—a work full of potency and promise of good in the care, preservation, and increase of our woods and waters.

"So in coming to New England and to Boston we, foresters of the Middle, Southern and Western States, feel that we are coming to confer with old friends and good friends, whose hospitality we have before enjoyed, and whose hearty and able promotion of forestry in this section makes a visit here an inspiration and an encouragement to those of us who come to you having similar aims and sympathies.

"We thank you for your welcome and we pledge our continued and active aid in the promotion of the forest measures you have at heart for the betterment of forest interests in the New England States."

Following the annual report of the Secretary, detailing the work of the Association during 1915, reporting 2,018 new members secured, and stating the popularity of the Association's magazine, AMERICAN FORESTRY, in its new and improved form, the President appointed a nominating committee, and the members then heard the two addresses scheduled for the afternoon. These were by Philip W. Ayres, forester for the Society for the Protection of the New Hampshire Forests on "The Weeks Law Situation," and by Harold Parker, of Lancaster, Mass., Chairman of the Massachusetts State Forest Commission, who spoke on "New England's Forestry Problems." The session closed with the election of the following officers:

President—Charles Lathrop Pack, Lakewood, N. J.

Vice-Presidents—Joshua L. Baily, Pennsylvania; Andrew Carnegie, New York; William S. Colby, California, Secretary the Sierra Club; Mrs. Emmons Crocker, Massachusetts; Dr. Charles W. Eliot, Massachusetts, President Emeritus Harvard University; Dr. B. E. Fernow, Canada, Dean of Forestry, University of Toronto; Henry

S. Graves, District of Columbia, Chief of the Forest Service; Everitt G. Griggs, Washington; Hon. David Houston, Secretary of Agriculture; Hon. Franklin K. Lane, Secretary of the Interior; Hon. Asbury F. Lever, South Carolina, United States Representative; Hon. Thomas Nelson Page, Ambassador to Italy; Gifford Pinchot, Pennsylvania; Filibert Roth, Michigan, Dean of Forestry, University of Michigan; Dr. J. T. Rothrock, Pennsylvania; Mrs. William D. Sherman, Illinois, Chairman Conservation Department, National Federation of Women's Clubs, Illinois; Hon. Wm. H. Taft, Connecticut, Ex-President United States; Joseph N. Teal, Oregon, Chairman Oregon Conservation Commission; Theodore N. Vail, President American Telephone and Telegraph Company, New York; Hon. John W. Weeks, Massachusetts, United States Senator; Dr. Robert S. Woodward, Washington, D. C., President Carnegie Institution.

Treasurer, John E. Jenks, Washington, D. C., Editor, *Army and Navy Register*.

Directors for three years, John S. Ames, Massachusetts; E. T. Allen, Oregon, Forester, Western Forestry and Conservation Association; Hon. Robert P. Bass, New Hampshire, ex-Governor of New Hampshire; Herman H. Chapman, Connecticut, Professor of Forestry, Yale Forest School; Dr. Henry S. Drinker, Pennsylvania, President Lehigh University; J. E. Rhodes, Louisiana, Secretary Southern Pine Association.

THE JOINT FORESTRY DINNER

In the evening was given the joint forestry dinner under the auspices of the American Forestry Association, the Massachusetts Forestry Association, and various co-operating forestry and conservation organizations of New England. Harold Parker, chairman of the Massachusetts State Forest Commission, was the toastmaster, in the absence of Mr. Nathaniel Kidder, president of the Massachusetts Forestry Association, who was ill. The speakers were Governor Samuel W. McCall, of Massachusetts; Dr. Charles W. Eliot, President Emeritus of Harvard University; President Charles Lathrop Pack, of the American Forestry Association; William S. Whitney, president of the Emerson Paper Company, of New Hampshire; and W. B. Greeley, assistant United States Forester.

Governor Samuel W. McCall, who was received with a round of cheers, began his address by alluding facetiously to the large demands on his time as Governor, saying that he had to be in so many places that it sometimes seemed as if he were spread out very thin.

"But I say that," proceeded the Governor, "not because I do not thoroughly enjoy coming here. You are members of an organization that represents one of the great causes that are before the American people today. When I was in the House of Representatives at Washington I took great interest in this movement for conservation. This country is in very much need of conservation. As applied to material resources conservation is a good deal

like conservatism in the field of the moral and intellectual forces. It is to hold on to what is good, preserve that, and go on from that and get something more by and by.

"The problem of the American people in the past twenty-five years has been to get rid of its forests. I remember that as a boy I saw any number of splendid trees cut down just to be burnt up and get the land cleared. But we have entered upon a new era. We are now developing the soil to cultivate it, and we have hardly enough soil left on which to have forests. So we are considering the problem of conserving our forests.

"I believe that our water power should be better utilized, but under conditions which would prevent it from getting into the hands of a few men and become subject to monopoly.

"Conservation with regard to forests means utilizing the forests, getting crops from them, utilizing the land to get other crops, for that is true conservation.

"I am very glad you are discussing the possibilities of Massachusetts in the way of raising forests. We have perhaps more than a million acres running to waste that might be devoted to the cultivation of forests. That problem concerns the vital prosperity and affects the total well-being of the country. The cause you represent here today is one that deeply concerns the Commonwealth of Massachusetts. It is one upon which we should have beneficial legislation, and beneath the legislation there should be a public sentiment created by bodies like this, such as will help on the cause."

THE SECOND DAY

President Charles Lathrop Pack presided at the second day's session, at which some three hundred were present. A paper by E. A. Sterling, manager of the Trade Extension Department of the National Lumber Manufacturers' Association, of Chicago, on "Forestry and Lumbering," was, in his absence, read by Secretary Percival S. Ridsdale. W. B. Greeley, assistant United States Forester, spoke on the "National Forestry Situation;" William W. Colton, Forest Commissioner of West Newton, Mass., had a paper on "City Forestry and Its Future," and H. H. Chapman, professor of forestry at the Yale Forest School, spoke earnestly on "State Forestry Organization and Problems."

At the afternoon session there were addresses by Prof. J. W. Toumey, Director of the Yale Forest School, on "Communal Forests;" by E. C. Hirst, State Forester of New Hampshire, on "State Fire Protection Work," and by Dr. H. T. Fernald, the Massachusetts State Nursery Inspector, on the "White Pine Blister Rust Menace."

These papers were followed by instructive discussions, in which a number of the members joined, the result being a most profitable presentation of ideas on the various subjects.

(NOTE.—Abstracts of papers read at the meeting will be found in this or succeeding issues of AMERICAN FORESTRY.—Editor.

Conservation at the Pan-American Scientific Congress

A MARKED feature of the Pan-American Congress held recently at Washington, D. C., was the correlation of work between departments having sympathetic features. Thus the president of the American Forestry Association was asked to deliver an address before the American Civic Association which held its annual convention in conjunction with the Congress, and in this address, after presenting the general forestry situation and the work of our association in the promotion of forestry conditions, President Drinker particularly touched on the association's advocacy of the creation of tree commissions and other civic organizations for the planting and care of trees, and on its educational campaign among the children of the country to promote interest in the growth and care of our trees and woodlands.

In the Conservation Section the addresses included several on forests and water power. Henry S. Graves, Chief Forester of the United States, in a paper on "The Forest Policy of a Nation," summed up his presentation of the subject as follows:

"A forest policy for a nation, then, as shown by the experience of the United States, would be based on the following considerations:

"1. Private ownership cannot be counted upon to conserve the forests.

"2. In its own protection a nation must take steps to prevent forest destruction.

"3. The forest land in agricultural regions should be handled as a farm crop; timberlands at the headwaters of streams should be owned or controlled by the public.

"4. Public lands should be segregated at least in a general way according to their chief use before beginning to dispose of them.

"5. The cost of correcting mistakes is always very great, as in buying back lands and in building works to check erosion.

"6. Public ownership does not retard development. It insures permanent industry. Private ownership results in temporary occupancy followed by exhaustion and depopulation.

"7. Unless there is a strong organization of public timber resources, their protection will remain largely a dead letter.

"In most of the South American countries the bulk of the forests are still in public ownership and so every opportunity is presented for a wise National Forest policy."

In an address on "Forest Problems and Economic Development in South America," Raphael Zon, Chief of Forest Investigations of the Forest Service, said: "Before the utilization of the forests of South America can be

placed on a permanent basis, more knowledge is needed as to the botanical identity of the species, their life histories, and the best methods of management. This can be accomplished only by forest investigations, experiment stations, and efficient forest organizations for the protection and management at least of all public forests. The experience of the United States and of other European countries shows that such investigations, if properly conducted, are indispensable to the intelligent utilization of the timber resources of a country."

The system under which the National Forests are used for grazing was outlined by Albert F. Potter, of the United States Forest Service, in a paper on "Government Control of Grazing on the Public Lands," as follows:

"1. Limitation in the number of stock grazed and the portion of the year during which the range may be used.

"2. Division of the range between the different kinds of stock and its owners.

"3. Permits on a per capita basis instead of leases on an acreage basis.

"4. Free grazing for milch and work animals of settlers and all animals used in operations upon the forests.

"5. Charges for ranging stock at moderate rates fixed by the Government instead of at market values fixed by competitive bid.

"6. Preference to small owners and prior users.

"7. Renewal of permits to purchasers.

"8. Maximum limits to prevent monopoly.

"9. Exchange in the use of private lands.

"10. On and off permits for ranges only partially within the forests.

"11. Cooperative construction of range improvements.

"12. Recognition of advisory boards to represent users of the range in the adjustment of range matters."

Dr. Elias Leiva Quiros, of Costa Rica, recommended in his paper on forestry that all the Latin-American countries interested in the conservation of forests promulgate forest codes, and that a general director of forests be made part of the organization of the Ministry of the Interior. He called attention to the danger of granting concessions ad libitum for the exploitation of forests, and recommended that forest reserves be formed.

In conclusion, he solicited of the Congress its approval of the following declaration:

First. That governments devote the greatest attention possible to the forest problem.

Second. That those governments of Latin-America which have not already done so proceed to the formation of a forest code and to the division of the limitation of public forests.

Third. That in all the countries represented in the congress a catalogue of the forests and of the personnel of the forest services be formed.

Fourth. That the cooperation of the public powers be solicited in the establishment of an arbor day.

WATER POWER

In his paper on "The Principles Controlling the Development of Water Power on Public Lands of the United States," O. C. Merrill, of the United States Forest Service, said: "The existing law provides for the issuance of a permit or license only. This is not sufficient protection for the hundreds of millions of dollars invested upon the public lands. Such investments should be protected by long-term leases, unalterable for their term and subject to either renewal at their expiration or to purchase of properties. For protection of the public interest, no rights obtained under a lease, or properties acquired for use in connection therewith, should be capitalized for purposes of rate making or of sale to any public agency at more than cost.

"The public should never part with its title to public power sites. Lands having a prospective value for power development should be open to entry only under conditions that will reserve the power use of such lands perpetually and exclusively to the United States or its lessees."

M. O. Leighton, in discussing Coordination in "The Development of Our Water Power Resources with Other Uses of Water," said: "Coordination between the uses of water for power and for irrigation involves fewer difficulties at the present time than it has in the past, and a still more harmonious condition is promised for the future. Among the causes for this improvement are improved irrigation and power practice, increased efficiency, and adaptability of hydroelectric appliances, including the hydroelectric pump, and a greater realization upon the part of persons representing conflicting interests that, in the final analysis, the greatest benefit to any community must arise from the amicable and considerate study of these matters and the mutual adjustment of the several demands to the needs and conditions that control in each case."

Director George Otis Smith, of the Geological Survey, in his paper on "The People's Interest in Water Power Resources," said:

"The people's interest in water power is served only through use.

"The stage at which we find power development on the public-owned sites today is simply this, as described by Secretary Lane in his recent report: 'The Government was generous, but it had no intentions of being a spendthrift. When it found itself being imposed upon, the nation stayed its hand and drew back, so as to make sure of the right course. It wished use—use by as many as possible and the best use.'

"The engineering fact that stands out in the utilization of water power is the comparatively high efficiency of large systems. Lower costs of operation and better service are results that appear to follow naturally the crea-

tion of these combinations of power plants. The centralization of power development is accompanied by a large market and diversified use; and the resulting high load factor has made possible low rates, which have, in turn, encouraged the more general use of power.

"Such are the advantages to the people that are possible through hydroelectric development as a natural monopoly; it remains to make the possible advantages actual. The most notable sign of the times is the general acceptance of the principle of public control."

The Engineering Section of the Congress, presided over by General Bixby, held a joint session with the Conservation and Mining sections, at which Rome G. Brown, of Minneapolis, presented an exhaustive paper on the "Laws and Regulations Regarding the Use of Water in Pan-American Countries." He said: "The energy of the water fall is not latent. That energy is a part of the constantly acting force of gravitation. It is ever present and, unless utilized, is forever wasted. Conservation therefore, of the natural resources of a country, demands the greatest and most immediate prevention of this constantly wasting energy from undeveloped water powers and of the quickest and most extensive utilization which can possibly be made consistently with proper protection of the interests of individuals and of the public at large." . . . "The cause of this uneconomic waste"—(of our water powers) "in all countries is, that legislation for the regulation and use of water resources, instead of promoting their use, has become an obstacle to their use. Legislation has not kept pace with the progress in the science of water power development and use."

THE RESOLUTIONS

The resolutions adopted by the Conservation Section of the Congress were as follows:

"1. *Cooperation in Study of Forest Resources.*—Cooperation in the intelligent development of the forest resources of the two American continents is made necessary and desirable by their mutual dependence, each upon products of the forests of the other. Central and South America use large quantities of structural woods from the forests of North America; and North America requires the extract and dyewoods and cabinet timbers of the Central and South American forests. The nations of Pan America should therefore cooperate in determining the extent and value of their forest resources, the best means for their conservation, and the most effective utilization of their products. As the first step in this direction there should be arranged, through the Government agencies of the Pan-American countries, a cooperative study of forest conditions and forest utilization of the Pan-American Union, with the publication of data thereon.

"2. *Public Ownership of Forest Lands.*—The experience of nearly all countries has shown that the private ownership of mountainous forests, on lands unsuited to agriculture, endangers the public welfare. The burdens of private ownership during the long periods necessary to grow forest crops often lead to wasteful and uneco-

nomical utilization of the forests and failure to conserve and renew them. Aside from loss of present and future timber resources, the destruction or depletion of mountain forests vitally affects the flow of streams and other physical conditions bearing directly upon the general economic welfare. As the investigation of forest conditions progresses, therefore, it is important for the countries of the Pan-American Union to consider to what extent public ownership of their forest resources may be necessary to utilize and conserve them effectively.

"3. *Forest Education.*—The vast extent and enormous value of the tropical forests in the countries comprising the Pan-American Union make it imperative that a school of tropical forestry for instruction in the scientific treatment and exploitation of such timberlands be established, preferably in a central or South American country.

"4. *Trade Specifications.*—To bring about better utilization of the forests of the Pan-American countries and to establish and extend their trade in forest products, it is recommended that uniform grades and specifications for such products, based upon the commercial qualities and uses of the various woods concerned, be mutually adopted."

NEW YORK STATE MEETING

THE Fourth Annual Meeting of the New York State Forestry Association was held in Syracuse, N. Y., on January 21. President James S. Whipple, former Conservation Commissioner, presided; Walter R. Stone, Mayor of Syracuse, delivered the address of welcome. President Whipple replied, and made his annual address, in which he laid especial emphasis on the need of greater numbers and of a paid secretary who would devote his entire time to the interests of the Association. The report of the common resolutions included these articles: The Association advocates a State-wide fire law; the Association endorses the work of the National Park Board; the broadening of the activities of the Association to include all phases of forest influence; the continuation of State-wide survey of forest conditions; recommendation of the Federal appropriation for \$50,000 to combat the Blister Rust; the annual appropriation of specific amounts for boundary surveys in the Adirondacks and Catskill mountains; and the establishment of a State constabulary, separate from the rangers and fish and game wardens.

The following officers were elected: President, Dr. James S. Whipple; Executive Secretary, Prof. Franklin F. Moon; Treasurer, N. B. Woodworth; Vice-Presidents, Hon. Elihu Root, Hon. Morgan J. O'Brien, Mr. Frank L. Moore, Hon. Franklin D. Roosevelt, Dr. A. S. Downing, Mrs. E. G. Whitmeyer, Dr. C. M. Dow, Hon. Rush Rhees, Hon. John R. Clancy, Mr. John G. Agar, Mr. E. F. Perry, Mr. Eugene S. Bruce, Hon. E. H. Smith, Mr. K. W. Goldthwaite, Dr. George G. Atwood, Hon. George D. Pratt, Mr. Frank A. Cutting, Mr. Jacob Hassacher, Mr. F. Ambrose Clark, Mr. John B. Burnham; Executive Committee, Dr. E. H. Hall, 3 years; Dr. Hugh P. Baker,

2 years; Prof. R. S. Hosmer, 3 years; Mr. George N. Ostrander, 3 years; Mr. O. H. Van Norden, 3 years; Mr. C. R. Pettis, 2 years; Auditors, Prof. Samuel N. Spring, Mr. W. G. Howard; Trustees Permanent Fund, Hon. Charles W. Dow, Mr. Frank E. Kendall, Mr. Walter C. Witherbee.

The Association has passed the crucial period of its life and now contains 600 enthusiastic members, publishes a magazine quarterly, and by enlarging its scope will appeal to an increasing number of citizens of the Empire State who love the trees and woods.

MID-WEST FORESTRY ASSOCIATION

A NUMBER of foresters, meeting at Columbus recently, organized the Mid-West Forestry Association, the constitution of which provides that the general objects of the Association are to be propaganda to advance the cause of forestry, particularly in the Middle West, and also, as far as possible, the study of technical forestry questions in the Great Plains region.

The officers elected are: President, Prof. Frederick Dunlap, University of Missouri, Columbia, Mo.; Vice-President, Prof. Charles A. Scott, State Forester of Kansas, Manhattan, Kans.; Secretary-Treasurer, Prof. Fred. W. Smith, State Forester of North Dakota, Bottineau, N. Dak. Executive Committee: J. H. Foster, State Forester of Texas; Prof. G. B. MacDonald, Iowa State College, and Dorr Skeels, Dean of Forestry, University of Montana.

PINE BLISTER RUST ORGANIZATION

AN organization, the title of which, Interstate Committee for the Suppression of the Pine Blister Rust, explains itself, has recently been organized. It will endeavor to get Congress to appropriate \$50,000 for the use of the Department of Agriculture in investigating the disease. The main committee comprises Wilfred Wheeler, of Massachusetts, chairman; F. W. Besley, Maryland; B. A. Chandler, Vermont; Robt. S. Conklin, Pennsylvania; W. T. Cox, Minnesota; Austin W. Hawes, Vermont; E. C. Hirst, New Hampshire; E. H. Jenkins, Connecticut; Frank E. Mace, Maine; Jesse B. Mowry, Rhode Island; C. R. Pettis, New York; Harris A. Reynolds, Massachusetts; Francis Windle, Pennsylvania; William P. Wharton, Massachusetts.

CANADIAN ASSOCIATION OFFICERS

THE following officers of the Canadian Forestry Association were elected at the annual meeting on January 20: President, Lieut. Col. J. B. Miller; Vice-President, Hon. Sydney Fisher; Secretary, Robson Black; Treasurer, Miss M. Robinson; Territorial Vice-Presidents, Ontario, Hon. G. H. Ferguson; Quebec, Hon. Jules Allard; New Brunswick, Hon. George J. Clarke; Nova Scotia, Hon. O. T. Daniels; Prince Edward Island, Hon. J. A. Matheson; Alberta, Hon. A. L. Sifton; British Columbia, Hon. W. R. Ross; Yukon, George Black; District of Patricia, Sir C. Cameron; Ungava, Mgr. Bruchesi, of Montreal.

Canadian Department

By ELLWOOD WILSON

Secretary, Canadian Society of Forest Engineers.

A discussion is at present being carried on, having been started by the Canadian Forestry Association, as to the advisability of requiring every person who enters the woods from the first of April to the first of November, whether to prospect, hunt, fish or camp, to have a permit which he would be required to show to any authorized fire-ranger. There would probably be no charge for such a permit, but it would certainly be a great help in locating the responsibility for forest fires and would make persons going into the woods much more careful as their movements would be known.

The Ontario government in building and operating their own railroad, the Temiskaming and Northern Ontario Railway, are taking great care to protect all timberlands along their right-of-way. They have in dangerous sections cleared quite a distance back from the tracks so as to form "fire zones," each train is followed by a patrolman on a speeder, and tank cars are held in readiness in case fire should break out. All engines are equipped with spark arresters and guards for the ash pans to further guard against fires. This line runs through the beautiful Temagami Forest Reserve which would be completely ruined by a large fire, a great disaster for the Province. The fire destruction in Northern Ontario in the past 25 years has been appalling and it is high time to save what is left. The example of this railroad might well be followed by the Dominion owned lines.

The Canadian Society of Forest Engineers has lost one of its most valued members by the death of Abraham Knechtel, Chief Forester, Dominion Parks Branch of the Department of the Interior. The late Mr. Knechtel was born at Brussels, Ontario, in 1859 and was in his fifty-sixth year. He was one of the pioneers in scientific forestry on this continent. He graduated from Michigan Agricultural College with the degree of Bachelor of Science and completed his forestry education at Cornell, taking the degree of Forest Engineer. For seven years he was attached to the Forest, Fish and Game Commission of New York State and then came to Ottawa to work with the Forestry Branch of the Department of the Interior. While in New York he laid out the first forest plantation made by that State. In 1904 he was sent to the St. Louis exhibition to lay out a forest nursery there for the Commission and received a special medal for his services there. He then went to Europe to study forest conditions and practice.

For several years he delivered lectures on Forestry under the auspices of the New York State School Board. He was one of the charter members of the Canadian Society of Forest Engineers and a member of the Canadian Forestry Association. His work as Forester of the Dominion Parks was of a high character and he will be greatly missed.

Mr. H. R. MacMillan, Chief Forester of British Columbia, now acting as Special Trade Commissioner for that Province, has reached Johannesburg, South Africa. He writes from there that he is having a hard fight against Southern yellow pine. The orders coming to British Columbia since he began his journey tell of the success of his mission, especially those received from the British War Office. It is rumored that he will go to the front. Although South Africa has made great progress in planting to establish its own supply of timber there is still a large demand, especially for railway ties.

The *Toronto City Architect* has undertaken tests of Canadian woods so as to encourage their use as building materials and lessen the importation of foreign species.

Dean Adams, of the Faculty of Applied Science of McGill University, in speaking before a meeting of the Montreal Forum about the natural resources of the Dominion, called attention to the rapid decrease in our timber and the erroneous impression that it was inexhaustible. He pointed out that the forests are disappearing at a rapid rate and that better fire protection and cutting methods are necessary. He made a strong plea for better methods and more public interest in conserving our natural resources.

Thirty-five per cent of the undergraduates and graduates of the Forestry Department of the University of Toronto have enlisted for service at the front. Of sixty-two graduates twenty had enlisted up to the twentieth of October and of the seventy-one undergraduates, twenty-seven had enlisted.

On the fifteenth of December a meeting of the most prominent lumbermen and paper mill men met at the Hotel Windsor, Montreal, to discuss necessary amendments

to the laws of the Province of Quebec for the protection of the forests from fire. There was very careful consideration and several amendments were suggested to the Hon. Minister of Lands and Forests and he was asked to have such amendments made law.

John H. Riegel, president of the Union Bag and Paper Company, announces that certain financial arrangements have been completed in regard to that Company's subsidiaries, The Gres Falls Company, St. Gabriel Lumber Company, and the Charlemagne and Lac Oureau Lumber Company, by which they will be consolidated into a new company to be called the St. Maurice Paper Company, and a new paper mill, a sulphite mill and a kraft paper mill will be added to the company's plant at Cap Madelaine, near Three Rivers, Quebec. These companies have extensive holdings of wood lands and have been among the staunchest friends of good fire protection.

At the government nurseries of Canada, located at Berthierville, for the Province of Quebec, at St. Williams, Ontario, for the Province of Ontario and at Indian Head, Saskatchewan, for the Dominion Government, and at another nursery being prepared at Sutherland, Saskatchewan, stock will again be available this year. The number of trees shipped from Indian Head has steadily increased from over two and one-half million in 1910 to about three and three-quarter million in 1914. These trees are distributed among farmers throughout the prairie provinces mainly for shelter belts, woodlots and the beautifying of grounds around buildings.

The fire loss in Canada for the season just finished has been about ten million dollars.

The Canadian Timber Products Association is about to send a representative to France to look into trade opportunities which will follow the war, and to offer some portable houses to the French government to help the homeless.

A bill is to be introduced in the coming session of the British Columbia Legislature authorizing the government to build thirty four-masted schooners to be fitted with auxiliary Diesel engines to be used in the lumber carrying trade.

On December 14 last, the Quebec government held an auction sale of timber lands which has been offered the previous spring but on which the upset price has not been bid.

A report made to the Forestry Branch of the Dominion government by Mr. J. A. Doucet, who examined about 8,000 square miles in Northern Alberta, shows a woeful state of affairs. Only 648 square miles retain a forest cover 100 years old or over.

Current Literature

This means that 92 per cent has been burned over at least once during the past century. About 8.5 per cent carries timber from 50 to 100 years old, the average age being about 70 years, while about 14 per cent bears timber of small pole size averaging 35 years old. In some places the soil cover has been entirely burnt off and in other places the heavy slash endangers the young growth and the little remaining old forest. The damage has been about eight million dollars.

Some tests of the weight of freshly cut woods have just been made by the Laurentide Company and show that brown ash weighs 50.26 pounds per cubic foot, yellow birch 64.40 pounds, white birch 55.62 pounds, elm 71.31 pounds, and sugar maple 73.36 pounds.

British Columbia Notes.

Ever since war broke out members of the British Columbia Forest Service have been leaving on furlough for the bigger job over seas, and they are still doing so. Out of the regular or permanent staff, which in the summer of 1914, before the war, numbered about 170, including female clerks and stenographers, almost one-third have enlisted to date. In addition, over twenty members of the temporary or summer staff of guards, patrolmen, etc., are known to have enlisted, and it is very probable that as many more have joined of whom no information is now available. The recent enlistments are as follows: A. H. Black, Jack Thompson, O. J. Sangar, W. Ross Flumerfelt, E. F. W. Heath, R. Jobson, J. J. Donnelly, N. F. Murray, R. L. Condy, J. R. Chamberlin, Clarence Ferris, H. S. Laughlin, G. R. A. Ball, G. H. Llewellyn, and C. I. McKenzie.

Mr. P. Z. Caverhill, Deputy District Forester in the Vancouver Forest District, has accepted the position of chief forester for New Brunswick. Mr. Caverhill is a native of that Province, a graduate of the University of New Brunswick, and has had a wide experience and been a valued officer both in the Dominion and British Columbia forest service. His many friends will wish him every success in his new work.

Mr. J. D. Gilmour, recently District Forester at Cranbrook, has been transferred to the head office, Victoria.

Mr. H. B. Murray, formerly District Forester, Kamloops, is now in charge of the Cranbrook District, and Mr. E. B. Prowd is acting district forester for the Kamloops District.

Mr. L. R. Andrews, formerly district forester at Vernon, is now in England, a lieutenant in the Canadian Expeditionary Force. Mr. G. P. Melrose is now acting district forester for Vernon District.

MONTHLY LIST FOR JANUARY, 1916

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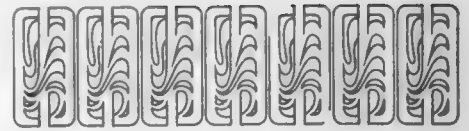
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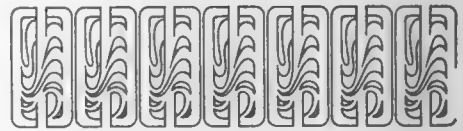


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American Forestry

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No. 267



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IT IS A VOLUNTARY organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.

IT IS INDEPENDENT, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.

IT ASSERTS THAT forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.

IT DECLARES THAT FORESTRY is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars' worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.

IT RECOGNIZES THAT forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.

IT WILL DEVOTE its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies

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AMERICAN FORESTRY

The Magazine of the American Forestry Association

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March, 1916. Vol. 22

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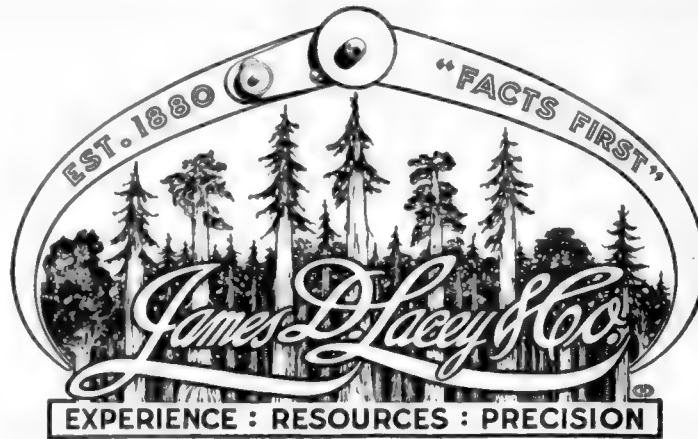
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*Shall Stumpage be an INVESTMENT,
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No. 267

Western Red Cedar

Identification and Characteristics

BY SAMUEL B. DETWILER

ENTHUSIASTS have called western red cedar "the world's overcoat wood," because its wood has extraordinary ability to resist decay. Another name, "Shinglewood," is appropriate, because it is the greatest shingle wood in the United States, furnishing more shingles than all other American species combined. It is widely known in the West as "canoe cedar," because the Indians of the Pacific Coast used it in making immense canoes. War canoes, made with crude implements from a single cedar log, were often sixty feet or more in length, eight feet across at the widest point, and capable of carrying a load upward of thirty tons. So faultless were the lines of these craft, when made in the perfection of the Indian's art, that canoes taken to the Atlantic Coast by early traders became the models from which Boston and New York shipbuilders constructed the famous clipper ships. The West Coast Indians still fashion cedar "dug-outs" of a beauty and symmetry surpassing the canoes made by white men.

The wood is soft, straight-grained, and easily worked, so durable and little subject to checking, that the sav-



THE WESTERN RED CEDAR

Showing the characteristic appearance of the foliage, cones, and seeds of the western red cedar. The small, scale-like leaves overlap each other so as to completely cover the flat twigs. The brownish cones (a) are borne in dense clusters or several together. They are composed of a few overlapping scales, which spread apart when the cones are ripe and liberate the tiny pale-brown seeds (b, natural size and enlarged three times), which bear a very thin, paper-like wing on two sides. The wings assist greatly in disseminating the seeds.

ages found it admirably fitted to their primitive needs. With rude tools of stone, bone and shell, they split it into beams and boards. From the fibrous inner bark they manufactured blankets, ropes, dog harness, fishing lines, mats and baskets. They even baked the beaten pulp of the innermost bark and served it with salmon oil as an article of food. Western red cedar is, in truth, the "family tree" of the "Siwash" Indians," for from it they have carved most of their massive totem poles, which sometimes exceed in size the great columns of European cathedrals. These weird emblems, fantastic family crests, so to speak, are sometimes forty to fifty feet high, and are skilfully hewed into grotesque figures of men and beasts so cleverly and strikingly colored that they never fail to attract the attention of the beholder.

Next to Douglas fir, Western red cedar is the most important timber tree of the northern Pacific Coast. Experts estimate that it comprises about one-third of the forest resources of British Columbia and one-eighth of the standing timber in the State of Washington. As a lumber-producing tree,

it is most important in southwestern British Columbia, the coast region of western Washington and other Western sections.

Cedar, a name of very ancient origin, meaning "life from the dead," has been applied to many unrelated kinds of wood which possess the one common characteristic of exceptional durability. The "Cedar of Lebanon" supplied the timbers for Solomon's temple, and the Egyptians used cedar oil for preserving mummies, and the wood for mummy cases. Carved figures of cedar, supposed to be more than three thousand years old, may be seen in the museums of today. In the United States, red cedar, incense cedar, southern white cedar, northern white cedar, and cypress are genera which have one or more species commonly known as "cedar," although in some cases this term is a local one only. Two species of *Arborvitae* are native to America, one being the white cedar of the northeastern United States, and the other western red cedar, sometimes called the giant *Arborvitae* or gigantic cedar.

Giant *Arborvitae*, like so many of the Pacific Coast trees, attains magnificent proportions. In the low fertile bottom lands near Puget Sound and Vancouver Island, specimens 200 feet high and 15 or 16 feet in diameter have been found. Its ordinary size is from $3\frac{1}{2}$ to 8 feet in diameter with a height of 100 to 150 feet. A prominent feature that gives this tree a very different appearance from other trees of the Pacific Coast is the rapid tapering of the trunk from a greatly enlarged and fluted base. A tree 15 feet in diameter near the ground is usually only 9 or 10 feet through 20 above. Young trees do not have excessively swollen or furrowed bases, and are regular in outline, making splendid poles. Practically all of the very old trees are hollow at the center for a considerable distance above the base.

Like most evergreen trees, when growing in the open, the cedar retains living branches almost to the top, thus forming a stately and symmetrical spire of green.



A WESTERN RED CEDAR, ANGELES NATIONAL FOREST, CALIFORNIA

Next to Douglas fir, the cedar is the most important timber tree in British Columbia and in the State of Washington. It grows over an area of about 300,000 square miles.

Trees growing in dense forests are free of branches for 40 to 80 feet above the ground, and the matured trunks usually are slightly curved. Young trees have slender, upcurving limbs, but as the branches grow in length they swing down in graceful curves, with an upward sweep of the ends. The top of a vigorously growing youthful cedar ends in a slender, nodding, whiplike tip. Not infrequently two tips—a "double leader"—are formed, causing a fork in the stem of the tree. As the trees grow in age they gradually develop rounding tops.

The bark is less than an inch thick, even on the large trees. In color it is bright cinnamon red, but the exterior is frequently a grayish brown from long exposure to the weather. Shallow seams separate the surface of the bark into narrow strips that extend irregularly, but continuously, the length of the trunk. These bands of bark are flat on young trees, but on older trees they become rounded. The inner bark is tough and fibrous, and can be peeled

from young trees in ribbons 20 or 30 feet long.

Like the eastern *Arborvitae*, the leaves are tiny scale-like affairs that overlap each other and press closely to the twigs. The latter are noticeably flat, branching and rebranching into open, fernlike fans of pale green that delight the eye. The leaves remain on the tree about three years; as the main stems of the branch develop, the short, flat side branches also die and fall.

Both the pollen-producing and the seed-forming flowers are borne on the same tree, but usually on different twigs. They are very small, brown, scaly bodies that bloom inconspicuously in the early spring. The clustered russet-brown cones are about one-half inch long and stand erect upon the branches. They consist of a few thin leathery scales arranged in pairs, the three middle pairs are larger than the others and each bears two or three seeds. The seeds are very small and light, with a pleasing aromatic odor. Each seed has thin gauzy wings on either side and almost surrounding it, instead of a single long wing at the end, as is the case with the seeds of most cone-bearing trees. The cones begin



THIS LOG HAS BEEN ON THE GROUND OVER 1,500 YEARS

A thousand years before Columbus discovered America the red cedar which the woodsman is seen cutting fell to the ground. Since then the three big cedar trees grew over it, reached great size, and were cut down. The largest of the three was 10½ feet in diameter, and showed an average of 28 rings to the inch, making it 1,449 years old. The fallen tree was found by the woodsman to be thoroughly sound and well-preserved, as he cut out of it numerous shingle bolts.

to open in August and the seeds sail away on the wind like tiny aeroplanes, scattering far and wide. A single tree produces thousands upon thousands of seeds each year, and at intervals of a few years extra large crops are borne. The seed must start to grow quickly or it loses its ability to germinate. It grows best in moist places, such as beds of moss or on decaying logs and stumps.

Nature has made it easy for the seeds to travel and they are produced so abundantly that young growth of western red cedar is plentiful in the regions of heavy rainfall, where this tree grows best, except where forest fires have wrought havoc by destroying the blanket of moss and vegetable mould that holds the moisture in the ground. Very few young red cedars are found where forest fires have destroyed vegetation and exposed the dry mineral soil. The seedlings have remarkable power to thrive in dense shade and will grow even to old age overshadowed by other trees. However, growth is more rapid where the trees receive plenty of sunlight. In dense forests old cedars have been found that have required more than 50 years to grow a single inch. Average growth is about one inch in radius in 10 years, but trees that have grown one-half inch per year for 20 successive years have been found. Some of the largest trees are 700 to 800 years old, or perhaps older.

Like other forest trees, the character of its growth

and its relative abundance in the forest varies with soil and moisture conditions and elevation above sea level. In swamps and swales it is sometimes the only evergreen tree in the forest, but such areas of pure growth are of limited size. It is generally found growing with western hemlock, Douglas fir, redwood, western white pine and other species. It is less common on dry southern slopes than on the moist north and east slopes, where it is found growing at greater elevations than on the southern exposures. It will grow on dry rocky soil, but does not develop well. Although it climbs the mountains to the height of more than a mile above sea level, near its upper limits it grows short and stunted, and at present is of little commercial importance above 3,000 feet elevation. At high altitudes, where the summers are short and the winter temperatures sometimes reach 35 degrees below zero, it becomes a mere shrub.

In the "cedar country" of British Columbia this species may constitute 50 per cent to 80 per cent of the merchantable timber. On selected areas the cedar logs cut from a single acre may scale 100,000 feet board measure, but such heavy stands are not often found. A good yield where cedar predominates is 30,000 to 60,000 board feet per acre.

The wood has about three-fourths of the strength and stiffness of white oak, and is light and soft. The heart wood is a dull reddish-brown, darkening on exposure;

the sapwood is narrow, and nearly white. The wood has a spicy odor, and, when polished, takes on a beautiful soft glossy finish. Durability is the quality that has made this wood famous. Oliver Wendell Holmes knew the qualities of cedar in general when he wrote:

" . . . the fair cedar, fallen before the breeze,
Lies self embalmed amidst the mouldering trees."

These lines seem especially to apply to western red cedar, trees that fell centuries before Columbus discovered America still lie in the forest as sound at heart as ever.

The worst enemy of western red cedar is fire. The bark of trees of all ages is so extremely thin that they

are easily killed by fire, and even a light ground fire causes scars through which the powder worms enter and bore through living cedars, as they sometimes do in dead ones.

The giant *Arborvitae* far exceeds our native eastern species both in beauty and rapidity of growth. It has been planted in England to some extent for ornamental purposes, where it grows well and forms a handsome tree. In the northeastern United States the Pacific Coast form does not thrive, and only trees grown from Montana or Idaho seed should be planted. Trees from Pacific Coast seed will grow in sections of the southeastern states where moisture and soil conditions are favorable.

Commercial Uses of Western Red Cedar

By H. P. WYCKOFF

GO into any State in the Union—North, East, South or West, and you will find on the homes of the most magnificent dwellings, the humblest cottages and the whole range between, the Red Cedar shingle. Nature, in her own good way, has given to the world a wood so perfectly adapted to be made into a covering that it has been universally adopted, and the man in New York, Florida, California, Washington, the Dakotas, Iowa or any other State in the Union, when he is ready to build, will draw on the old cedar tree.

Its commercial range in the United States may be

divided into two regions: The "Inland Empire" region of western Montana, northern Idaho, and eastern Washington; and the west coast region of western Washington and northwestern Oregon. It ranges from southeastern Alaska to northern California, and eastward through southeastern British Columbia and northern Washington to northern Idaho and Montana.

In Alaska it is confined to the islands and the ocean side of the coast ranges from sea level to 3,000 feet. In British Columbia it occurs on the islands and extends along the Coast ranges up to 2,400 feet, also occurring along the slopes of the southern Gold and Selkirk Mountains, and on the west side of the Continental Divide up to 6,000 feet. In the United States the species occurs abundantly in the forests of the Olympic Mountains, coast ranges, and west slopes of the Cascades, but here rarely extends above 4,000 feet. On the east slope of the Cascades and in the northeastern part of Washington it is less abundant, and here is found chiefly between altitudes of 1,500 and 4,500 feet. In Oregon it inhabits both sides of the Coast ranges and the west side of the Cascades only, reaching from sea level to 5,000 feet, and in one instance to even 7,000 feet. In California it is not common, and is confined to the sea side of the coast ranges within the fog belt. In northern Idaho it is plentiful in the humid for-



THE FAMOUS RED CEDAR SHINGLES

centage of red cedar is used for shingles, the wood being peculiarly adaptable for this purpose. There is a market for each and every grade of this shingle.



WESTERN RED CEDAR AS A RESIDENCE

Near Seattle, Washington, an enormous red cedar stump has been made into a home for a fairly large family. It is roofed over with shakes, split shingles, also of red cedar. The stump was originally used as the postoffice of the county in which it is located, serving in this capacity for a number of years before it was turned into a residence.

ests of the "panhandle" and reaches its eastern limit in western Montana.

Its local distribution is confined to regions of plentiful precipitation, and chiefly to wet or constantly moist situations. In the Puget Sound region it occurs chiefly in river bottoms, on moist flats, in and around swamps, on benches and gentle slopes and in cool, moist gulches and ravines.

It does not occur in the dry basin between the Cascades and the Rocky Mountains in either Oregon or Washington, but reappears abundantly in the humid forest region of the "Inland Empire" in northeastern Washington and northern Idaho.

The western red cedar can be used for a great many different purposes, but the most valuable characteristics are its lightness and durability. This makes it exceptionally valuable for fences, posts, poles, certain classes of piling, also certain forms of lumber, but especially for shingles. Probably 75 per cent of all the cedar cut goes into shingles, the other 25 per cent going to the various uses named.

Through the sections of the country where cedar thrives there are many examples of the durability of this wood. Almost any place along the waters of the Pacific

Coast, from Oregon to Alaska, one may find the old Indian canoe made of red cedar. The old block houses built by the Indians were of red cedar. One on San Juan Island, built in the year 1856, is roofed with red cedar shingles. This roof today is in perfect condition.

Near Seattle, Washington, is the home of a fairly large family which is built in an enormous cedar stump which has been roofed over with shakes (split shingles). This stump was originally used for the postoffice of the county in which it is located, serving in this capacity for a number of years before it was turned into its present mission.

There is also, or was until very recent years, a remarkable example of the durability of a cedar log which had laid on the ground for at least 1,500 years. After the original tree had fallen, three other cedar trees had grown over it. These cedars in turn reached a remarkable size, and were cut down. The largest of these trees was 10½ feet in diameter and showed an average of 23 rings to the inch. This would mean that this particular tree was 1,449 years old and during all these years the log had laid there during alternate wet and dry seasons and endured the most favorable conditions for decay. At the time the picture, which you see in

this article, was taken, a woodsman was cutting shingle bolts out of this oldtimer and these bolts were just as sound as the day when the log was in its prime.

There is one special case of an old home which now stands near Tacoma, Washington. The roof of this

home, built of sawed red cedar shingles, is 30 years old and never has been painted. This roof is still in perfect condition, with the exception of a few loose shingles, the result of the nails having rusted off. The owner of this place says that had the proper nails been used the roof would be good for ten or fifteen years more. It is this exceptionally remarkable durability, together with the lightness and the ease with which the timber is worked, that makes red cedar unequaled anywhere for shingle material. Nature has done all she can on the raw material and has left the manufacturing to the mortal.

POLES, PILING, FENCE POSTS AND LUMBER

Cedar is employed for uses where lightness and durability are required rather than strength. The combined assets of size and durability make cedar exceptionally adaptable for telephone poles, some kinds of piling, and fence posts. It is almost impossible to put any kind of timber in the ground without its decaying in a very, very short time at the ground line. This is due to the fact that you have at this point light, heat, and alternate wetting and drying, which are the essential qualifications to promote decay. The suitable taper of the tree and the pole lengths obtainable, together with the durability, have caused western red cedar to become the standard pole timber.

Red cedar is used to some certain extent in lumber. This refers particularly to the red cedar siding. Again is found a use where durability and lightness are the essential features. There are also two other characteristics of the red cedar which make it particularly adaptable for this use. These are the slight shrinkage and expansion due to different moisture conditions of the wood; also the ease with which this timber will take nails without splitting. Only a small percentage of cedar used goes for these combined purposes. The big majority is used in cedar shingles.

Any product which is furnished by nature is necessarily produced in different grades; apples, berries, nuts, vegetables come in different stages of perfection. It is no different with cedar. The raw material develops in different grades due to different localities, different climatic conditions, different altitudes and various other agencies, and there are defects such as knots, poor grain, inferior growth, etc. In order to put the manufacture of shingles on a practical basis, it is necessary to make grades which include some of these defects, the percentage of high and low grades depending very much upon the timber. There is a market for each and every grade of shingles. Temporary buildings, such as sheds, play houses, tool houses and any and all temporary structures, should logically use the cheap or poorer grade of shingles. Permanent



TUNNEL THROUGH A WESTERN RED CEDAR

of the size of these trees, and also of the shaggy bark which makes the work of distribution so easy. The tree stands along a roadside in

structures should not consider anything other than high-class grades. A shingle need not be absolutely clear to be first class. It might have minor defects in the tip without injuring the grade of the shingle one iota, but it should be free from sap and practically vertical grain. It is like throwing cold water in the face of the word "conservation" to advocate the use of only absolutely clear shingles. There is a use for all grades of shingles and the greatest task that the manufacturer has today, in order to put his business on a permanent

foundation, is to educate the consumer on the proper grades to use on the proper place.

The shingle manufacturers also have another very important task on their hands to correct the false impression on the part of the general public regarding the fire risk of shingles. This impression is largely due to competitors of wooden shingles.

The cedar tree does not claim preeminence where strength is required, but it does claim unexcelled recognition for durability and lightness.

The White-Pine Blister Rust Situation

By DR. PERLEY SPAULDING

Pathologist, U. S. Department of Agriculture

IN AMERICAN FORESTRY for February attention was called to the serious disease of white pines which was introduced some years ago from Europe. A colored plate was also printed showing the different stages of this disease upon white pines and the leaves of currants and gooseberries. Herewith is a diagram indicating the complete life history of the parasite causing this disease. The arrows show the transfer of the disease from one plant to the next.

Figure 1 is the spring stage of the disease as it breaks out upon the infected white pines. Immense numbers of very minute dustlike yellow spores (seeds) are produced upon the pine. These are blown about by the wind and fall upon the leaves of any currants or gooseberries that may be in the vicinity. On these leaves, Figure 2, they germinate and send the root into the soft portions of the leaf. Two weeks later a second crop of spores is produced upon the leaf. The disease then may do one of two things—it may produce a second generation of the same kind of spores, as indicated in Figure 3, or there may be produced a distinct form of disease as shown in Figure 4.

The form shown upon Figures 2 and 3 may be called the yellow summer stage. This is capable of repeating itself every two weeks until the end of the season. This is the stage where the disease spreads rapidly upon currants and gooseberries. It is very easy to see that if the disease advances 200 feet with each generation of spores produced, by the end of the season it may have progressed a very considerable distance from the pine which started the disease early in the spring. The brown autumn form of the disease shown in Figure 4 may be found from the latter part of July until the leaves have fallen. Upon the rather stout brown hairs is produced a third form of spores. These spores in turn, instead of spreading the disease upon currants or gooseberries are able to attack only the young bark of white pine. In this way the complete life cycle of the parasite from pine to currant or gooseberry and then back to white pine takes place during a single summer. The disease, however, does not show upon the newly infected white pines until one or more years later.

Any planting of white pine done from this time onward

should be made with trees secured under the following conditions. The person supplying them should be required to furnish a written guarantee that his stock fulfills the following conditions:

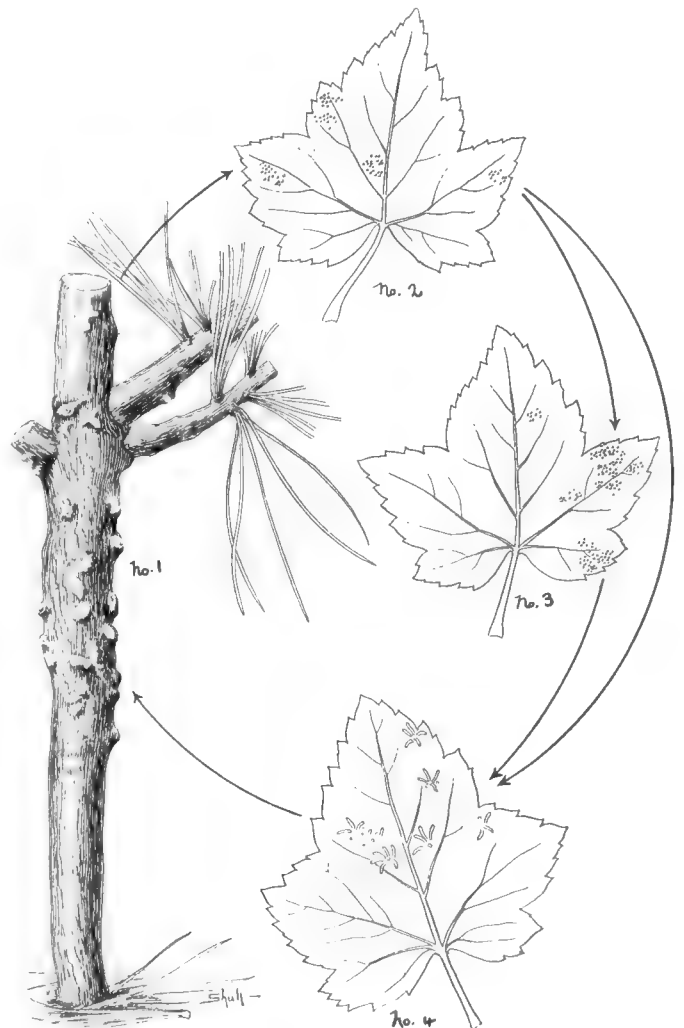


DIAGRAM SHOWING PROGRESS OF WHITE PINE BLISTER RUST

- No. 1. The pine infected with the blister rust, showing condition as found in the spring.
 No. 2. The currant, or gooseberry, leaf, showing the second stage of the disease, resulting from infection with the spores from a pine.
 No. 3. Currant or gooseberry leaf, showing second generation of second stage of the disease, the result of infection of spores from currant or gooseberry leaves.
 No. 4. The third spore stage on currant and gooseberry leaves, the condition being that in which it is transmitted to the pine trees.

1. It was raised from seed in the nursery of the person from whom it was purchased.

2. It was raised in a nursery which contains no imported 5-needled pines nor imported currants or gooseberries.

3. It was raised in a nursery which is, and has always been, free from white pine blister rust on 5-needled pines and on currants or gooseberries. These conditions and these only will insure absolute freedom from this disease. A certificate of inspection showing that the disease is not now present in the nursery is valueless, because it is absolutely impossible to determine the freedom of a nursery by inspection alone.

If you have a general interest in the preservation of the white pines of your vicinity, communicate with your state officials and legislators, calling attention to this serious trouble and the desirability of immediate and efficient action against it. The matter of the placing of a state quarantine with reference to this disease is one which should be seriously considered, especially by those states which are not known to have any of the disease. On February 4 the Federal Horticultural Board of the United States Department of Agriculture held a hearing concerning the advisability of placing a federal quarantine upon the shipment of all 5-leaved pines and of cultivated black currants from the states in which the disease is now known to be present. It is very probable that some means of controlling the shipment of such stock will be put in force. Attention should be called, however, to the fact that the disease may later be found in almost any other state of the country. It is therefore very desirable that each of the states protect itself by local action so far as is possible.

NORTH CAROLINA'S MEETING

AT the Sixth Annual Convention of the North Carolina Forestry Association, held in Newbern, N. C., Mr. C. L. Ives, president of the Newbern Chamber of Commerce, in welcoming the delegates, referred to the fact that it was there that the North Carolina State Forestry Association was formed eighteen years ago. Mr. Ives himself was elected president at that time, and the main question then discussed was of securing protection against forest fires. President Nathan O'Berry, who is also president of the North Carolina Pine Association, dealt, in his annual address, on the great need for educational and propaganda work. He appealed to the lumbermen and timberland owners to support the movement and said: "When you consider that in eastern Carolina alone more than \$2,000,000 annually is paid out for standing timber, does not this great industry seem worth perpetuating?" Mr. W. W. Ashe, of the Forest Service, in a paper on "The Future Use of Pine Land," insisted that even in eastern North Carolina, where a large part of the land would eventually be used for agriculture, "the owners of land now in mature timber must see that the timber is cut with due regard to the future earning value of the property; the owner with young growth must defer the cutting of that until it has

reached its maximum rate of value increment and so cut as to secure that increment; the holder of cut-over lands must see that they are properly stocked and that there is no waste or nonproductive area."

Mr. C. I. Millard, president of the John L. Roper Lumber Company of Norfolk, among other things brought out strongly the need for State experimental and demonstration forests, and offered to give the necessary land for such an area in the Loblolly Pine region. This offer was accepted by the State geologist on behalf of the Geological Board, which has recently been empowered by the Legislature to receive gifts of land for this purpose.

Addresses by Mr. R. E. Parker, secretary of the Audubon Society of North Carolina, on "Game and Shore Birds as a State Asset," and by Professor John J. Blair, superintendent of the City Schools of Wilmington, on "Arbor Day in Our Public Schools," were the features of the afternoon session. An illustrated lecture at night, on "Forest Conservation," by Dr. Joseph Hyde Pratt, State geologist, brought the regular sessions to a close.

Mr. C. C. Smoot, III, of North Wilkesboro, was elected president, and Mr. J. S. Holmes, of Chapel Hill, was reelected secretary-treasurer. A special committee, composed of Mr. Guy A. Cardwell, Dr. Joseph Hyde Pratt and Mr. R. R. Cotten, was appointed to draft resolutions regarding the death of Dr. J. A. Holmes. In reporting, this committee referred to the splendid work Dr. Holmes had accomplished in starting forest conservation work in North Carolina, endorsed the Joseph Austin Holmes "Safety First" Association and pledged the aid of the Forestry Association to the endowment of that memorial.

Resolutions were also adopted urging the continuance of the annual appropriation of \$2,000,000 for the purchase of land under the Weeks Law, demanding that the Federal appropriation for co-operating with States in fire prevention be made permanent and asking Congress to aid in the suppression of the white pine blister rust.

FOREST STUDENTS' PLANS

FOR ten weeks during the coming summer, a party of students and their instructors from the Department of Forestry at Cornell will be in camp on a forested tract at the south end of Saratoga Lake. This summer course in practical forestry in the woods forms a regular part of the work in the third, or summer, term at the State College of Agriculture, and the transfer of faculty and students from Ithaca to a forest area is made for the purpose of getting first-hand information in the woods themselves. The instructors feel that practical woods work can be satisfactorily taught only in the forest. The summer term is of the same length and character of work as the spring and fall terms, and the same schedules of lectures and examinations are required. It differs from the other courses only in the fact that the woods take the place of the classrooms. Courses will include forest measurements, forest utilization, the study of tree growth, and forest management.



THIS MAY BE SEEN BY MANY TOURISTS

Few caves of any size in the cliffs of this country were overlooked by these seekers after impregnable homes. The one here shown is about 6¼ miles east of the Roosevelt Dam, and is admirably located for view. The ruins of Arizona are more accessible to rail and sleeping accommodations, being practically on the main line of the Southern Pacific and reached by auto from Globe or Phoenix. At the Dam is a comfortable lodge, only 6¼ miles from the ruins.

Mesa Verde and Casa Grande National Parks

BY MARK DANIELS

Former Superintendent of National Parks

"I CAME like Water, and like Wind I go."

Pregnant with mystery and romance, wrapped in serene and lofty silence, at the top of the continent lies the great green mesa that was once the abode of a race that has long since been forgotten. To the north, the east, the west, the south on lower plains, the soil is plowed, the fields are tilled, and upon the breeze is borne the hum of man's endeavor. But no sound rises to the level of those silent cities and crumbling walls, that hold the traveler in the spell of their aged mysteries. Whence came these men who hewed the stones and timbers of their buildings with crudely fashioned implements, yet placed them with such skill that they have withstood the centuries? Where are the children of those other children who in the morning of time thronged the Great Mesa and scaled the cliffs in such numbers that the paths worn by their naked feet are still deep in the attesting stone?

"I came like Water, and like Wind I go."

Tucked away in huge caverns near the tops of great, precipitous cliffs and overlooking the desert below and

beyond, with its ever-changing lines, these wonderful ruins stand as monuments to at least one philosophy of Omar Khayyam, for we know not whence they came nor why, nor why they went nor where. There are their towers and outposts, their grain rooms and secret chambers, their work rooms and living rooms, but amongst all the things unearthed there, nothing has told the secret of their race. What tragic truths are locked forever within those silent cliffs! The life of a nation! The death of a race! Efforts have been made to read their story from the evidences left and much has been learned, but not enough to make the history complete. Nor are the mystery and the search for its solution the only fascinations that draw the tourist to this land, for the skies are ever sparkling clear, the air is balmy and of a purity that annihilates distance. To one standing at the edge of the cliffs that bound the southern extremities of the mesa, the mountains of New Mexico that lie beyond the desert, seem distant but a stone's throw. Stretching between the cliffs and these distant mountains

lies the great desert striped with crimson, purple and tan broken here and there with great up-thrust rocks, towering monuments of the desert gods. On every side are canyons with ruins here and there and the traveler may wander for days from one to another, fascinated, thrilled and lost in endless conjecture.

The Park is reached by the Denver and Rio Grande Railroad, which delivers its passengers at Mancos in the southern part of Colorado whence a trip of 20 odd

The top of the mesa is covered with stunted cedars and pines, and its elevation changes gradually from 8,200 feet at the northern boundary of the Park to 6,800 feet at the southern boundary. This elevation gives the cool, crisp climate that is one of the greatest charms of the Park. In addition to the cliff dwellings that are to be found in the caves along the canyon walls, the top of the mesa is dotted with remains of mound-builder dwellings.



CLIFF DWELLINGS NEAR ROOSEVELT DAM, ARIZONA, OVER GLOBE-PHOENIX AUTO ROAD

A turn of the Apache Trail takes the tourist past this unusual ruin, where the walls were surfaced with a plaster of adobe. Perhaps this was the first step toward the modern hard-wall finish for interiors, and it is doubtful whether our modern plastering would stand the same test of time, although the dry atmosphere of Arizona favors the antique.

miles will take the tourist to the ruins. The town of Mancos lies in a small valley, from the rim of which this great smooth mesa slopes at a slight grade to the southwest, cut in the direction of its slope by a series of deep canyons which, by erosion, have been extended like fingers into the high plateau. These canyons vary in depth from 500 to 1,000 feet, their walls being in most places practically vertical. The formation of the country is sandstone, and as a result there are broken ledges which have formed great piles of talus, so that at the present time it is possible, by means of carefully picking

The ascent on to the mesa is made from Mancos, which is at an elevation of approximately 7,000 feet, by automobile along a road which climbs the face of steep bluffs to the edge of the cliffs on the northern boundary of the Park. From here, to the north, is a view of the great Montezuma Valley, one of the most fertile of the many valleys in the State of Colorado. There are few places in this country where the observer is so impressed with the panorama that stretches before him. The one and only road that traverses the Park follows the edge of the northern cliffs to the Chapin Mesa, passing by an old dried well of this lost race to the lower portion of

the Park, and then stops in the vicinity of one of the finest ruins, "Spruce Tree House."

This ruin is located in a short spur of Spruce Canyon, and is at an elevation of about 6,900 feet above sea-level. From the brink of the canyon one sees stretched out before him the great desert of Arizona and New Mexico, quivering in the heat of the southern sun. In the distance may be seen the hazy peaks of the mountains of New Mexico which form the southern boundaries of the great desert expanse. From the top of the mesa the ingenious trail that leads to the entrance of the cave passes down through small crevices and over projecting ledges to the ruins.

The first thing that strikes the visitor is the unusual circular chambers that appear like pits in the floor of the ruin. These chambers are called "Kivas," and are presumed to have fulfilled the function of ceremonial rooms. In Spruce Tree House there are approximately eight of these rooms, which were used by an estimated population of 400 persons. Back of these are the chambers which were occupied by the inhabitants of this ancient village. The cave

with smaller stones. The hewn stones were shaped with the aid of implements made of a harder stone and in many instances the trueness with which they were laid suggests the presence of a plumb line and the absence of labor unions. In some ruins may be found the whetstone, as it were, a large boulder of sandstone, the deep grooves in



Photograph by Mark Daniels.

THE ENTRANCE TO THE KIVA

This is by ladder through a square hole in the roof. The top, or roof, performs the function of surface for the open terrace. The roof of this cave is strongly blackened by smoke that rose from fires of centuries ago, but the walls are clean and well preserved.

which testify to this primitive method of sharpening an axe. It must have been a joy to the youths of the day that there were no creaking grindstones to turn for father.

Spruce Tree House was discovered and named in 1888 by two brothers who ranged cattle in the neighborhood, but this fact does not excuse the government and the committee on naming things (or whatever it is that is responsible for the names of our national parks and other places) from continuing the use of the word "house" to describe a group of houses large enough to accommodate 400 persons or more. How would we like to feel that posterity, in the event that the fate of some of our great cities should be that of Tyre or Sodom, might fasten upon it the ignoble title of River House or Painted



Photograph by Mark Daniels.

CLIFF PALACE, THE LARGEST KNOWN GROUP OF RUINS

The round, vat-like chambers in the sunlight are kivas, or ceremonial rooms, in which war councils were held. The round tower shown is the only one completely circular to be found in the Mesa Verde ruins. The square tower just beyond was once four stories in height, a proud skyscraper of this ancient race.

is 216 feet in length and 89 feet in depth at its widest point. There are 114 rooms in the village, some of which were at one time three stories high. It has been shown that at least fourteen of these rooms were uninhabited, and were used as mortuary chambers or for storage. I said that the first thing which struck the visitor was the circular chambers, but perhaps it is the wonderful degree of preservation shown by these walls. Whether theirs was a representative form of government or not it is certain that the pork barrel principle of construction was unknown to them, for some of their stone walls have stood for nearly a thousand years without the aid of an annual appropriation for maintenance. The walls and partitions are laid up in hewn stone, set in adobe mortar and occasionally chinked



Photograph by Mark Daniels.

A CHANCE FOR THE ROMANTIC

The balcony and the parapet wall of Balcony House are the most interesting features of this ruin. Whether the balcony was used by dusky lovers of a starlit night or put only to the prosaic use of a means of communication will probably never be known. Until it is, however, the romantic are privileged to attribute to it the former use.

House? These names are most misleading and give the stranger the impression that the ruins are but the remains of an occasional dwelling rather than those of a village of 400 souls.

The largest group of ruins in the Park, and perhaps the largest known to have been built by this strange race of people, is the one so unhappily yeclpt "Cliff Palace."



Photograph by Mark Daniels.

SPRUCE TREE HOUSE

This is located near the upper end of a spur of Spruce Canyon. It was given the name because of the large spruce tree in the foreground. The park ranger station and tourist headquarters are directly across the canyon on the opposite rim. From there this and other fine views of the ruins may be had.

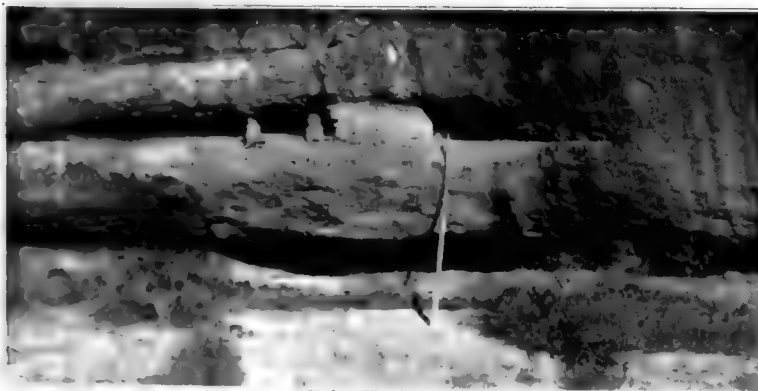
Here again the responsibility of a misnomer should bring the pangs of regret to the committee on names. It lies in an eastern spur of Cliff Canyon and is an enormous cavern with roof arching nearly a hundred feet above a floor which is several hundred feet above the bottom of the canyon. From the terraces of the ruins one may look toward the west across the canyon and see on the top of a great promontory the fallen stones which once formed a pueblo. There is an example in Cliff Palace of a four-storied structure which was, in all likelihood, used for living quarters. It is the furthest square tower shown in the photograph and lays claim as the predecessor of the modern tenement. Whether the choicer rooms were considered those on the upper floors or not cannot be said, but in light of the fact



Photograph by Mark Daniels.

BALCONY HOUSE

This is the only example of the use of balcony construction found among the ruins of the Cliff Dwellers. From the parapet wall there is a sheer drop of several hundred feet to the floor of the canyon below. Even at the present time the village is accessible from one end only, and that by virtue of the crumbled walls.



Photograph by Mark Daniels.

A SUBURBAN COTTAGE

When the village became filled some were forced to take up their abode in the crevices near the main cave. The means of access was the pole, on which enough of the branches had been allowed to remain to hold the timbering owner.

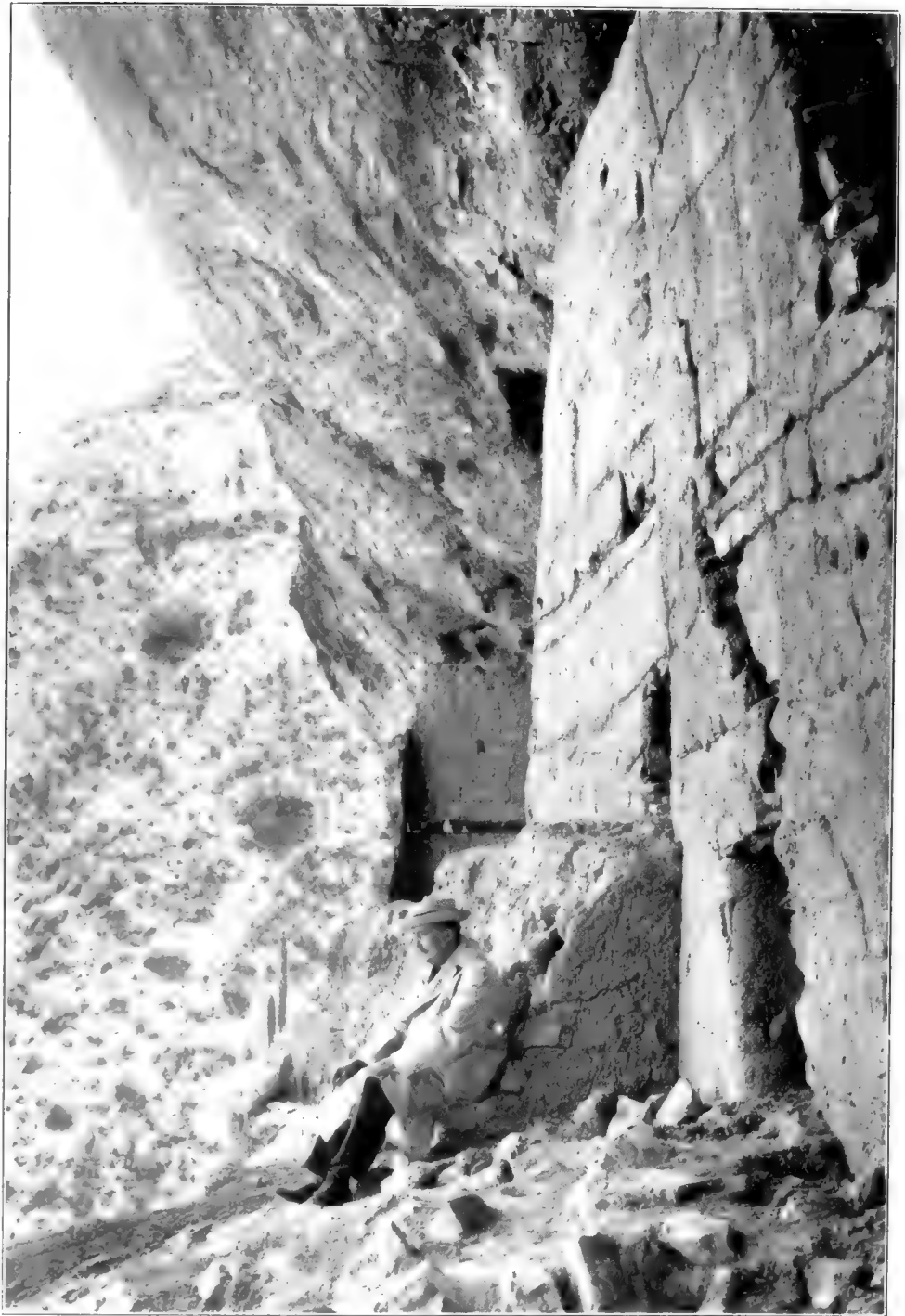
that the smoke from the numerous family fires found its only outlet by flowing along the surface of the roof, it is more than probable that the upper floors fell into the class of our present "fifth floor back."

There are three distinct terraces which are readily recognizable by the different levels of the Kivas. These Kivas were the ceremonial rooms used by the different clans of warriors, or at least, such is the contention of those who have studied the subject. It is presumed that in a city of the size of Cliff Palace, which probably accommodated in the neighborhood of one thousand people, there were a number of clans, the warriors of which preferred to meet in the war chamber of their own particular clan. It is certain that if anything but the most amicable relations existed between the members of the various classes not many of them could have been housed in one Kiva without the certainty of a fight. These Kivas are of peculiar construction and always built along the same lines. They are circular in form and contain a fireplace with a stone slab for baffle board, which deflected the smoke and regulated the draught. Some Kivas have a small hole in the floor, presumed to have been

used in religious rites for a communication with the underworld. The roofs of the Kivas were covered with cedar beams and adobe floor above and formed part of the area way of the terrace. In most Kivas access was secured through a hole in the top. While the Kivas are of interest in all of the ruins, to my way of thinking, the most fascinating bit of structure in Cliff Palace is the Speaker Chief's Tower, as it has been named by someone with imagination. It is at the northern end of the village and overlooks the entire arrangement from a quite commanding position. On the second floor level is a landing which may have been used by the chief of the tribe to address the warriors of his city. The outer face of the Tower proper is circular in form, above which are a series of loopholes,

probably designed for the protection of the mighty chief. The Tower itself, together with the various chambers connected to it, really more closely approximates the idea of architecture than any structure that may be found in the ruins of the Mesa Verde.

Located in about the center of the village is the only example of a circular tower that can be found in any of the villages. This rises in the rear to the roof and perhaps at one time was higher in front than shown. It is ringed about midway with a row of loopholes and is of unusually good masonry and thoroughly well built. Whether this tower was used for purposes of defense, observation, or as spacious drawing rooms for the ladies of the court has never been definitely settled, for in those perilous times the element of defense entered into every walk of life. That there were several walks of life in the days of the Cliff Dwellers is evidenced by the fact that they manufactured cotton cloth, fiber sandals, feather cloth and many articles of attire. The feather cloth which these people used is particularly attractive and of a quality that would undoubtedly lead a woman of today through a bargain-counter rush, were it manufactured and on sale at the present time. The body of this cloth is a coarsely woven cotton wool in which the downy portions of feathers are woven so that a shawl made of this material presents nothing but a surface similar to eiderdown. Samples of it were found enshrouding mummies unearthed in some of the sealed chambers. There are a great number of other ruins which, while not so large as Cliff Palace and Spruce Tree House, are in some respects more fascinating. In Navajo Canyon, of which Spruce Canyon is a branch, are the Watch Tower, Thomas House and Peabody House. In Cliff Canyon are Painted House, Willow House, Community House and the Swallows' Nest. In Soda Canyon there is the Balcony House, the only example of cliff dwelling architecture that shows the use of a balcony. Here one's imagination can picture children of cliff dwellers dangling their brown toes over



A SMALL RUIN IN A GOOD STATE OF PRESERVATION

This is in the vicinity of the Roosevelt Dam. The overhanging ledge of the cliff admirably protects the walls of the ruin from the weather, but not from the depredations of the tourists. The view from the windows and doors bespeak an eye for the beautiful on the part of the builders.

the parapet walls and hurling stones upon wild beasts below, happy in the security of their impregnable homes.

There are other examples of the ruins of the Cliff Dwellers scattered along a general line drawn in a south-westerly direction from the Mesa Verde. The Government has seen fit to establish a park around another group of these ruins which are located at Casa Grande. The entire district in the vicinity of Casa Grande, Globe and the Roosevelt Dam is dotted here and there with ruins of the Cliff Dwellers. Those at Casa Grande are not so fine or so interesting as the ruins near the Roosevelt

Dam. The ruins of this district are reached from the Southern Pacific at Casa Grande Station, which is about twelve or fifteen miles from the Reservation, but the most interesting and complete trip is along the Phoenix to Globe auto road which traverses the old Apache trail. This trip is particularly attractive, as it is only a link en route, for the tourist traveling west can go to Globe on the Southern Pacific & Arizona Eastern Railroad and travel from there to Phoenix, Arizona, by automobile, covering the Apache Trail, the Roosevelt Dam, the Cliff Dwellings, and view the famous Superstition Mountains.

There are two groups of Cliff Dwellings near the Dam, one of which is about four and a half miles from the Dam. Farther up on the mountainside is a more extensive group, the walls and structures of which are in a remarkable condition of preservation. The ruins of Casa Grande are mostly of the form of foundations showing the locations where the walls were once placed, while those of the Roosevelt Dam country are better preserved.

As a mecca for the American tourist whose avenues of escape to the land of the upturned palm have been closed the country of the Cliff Dwellers extends unprecedented attractions. Primarily, the climate of the Great Mesa is, in so far as my knowledge extends, the most attractive and invigorating that can be found. The skies are cloudless from May until November. The atmosphere is as dry as can be imagined. The temperature is such that one is comfortable with or without a coat, and the scenery in general is of an exotic character that fascinates beyond description. Couple with this the wonderful experience of climbing in and out through the ruined structures of an ancient people and the possibility of discovering some small article that may prove to be a missing link which has escaped the trained eye of scientists, and you have a tourist's paradise.

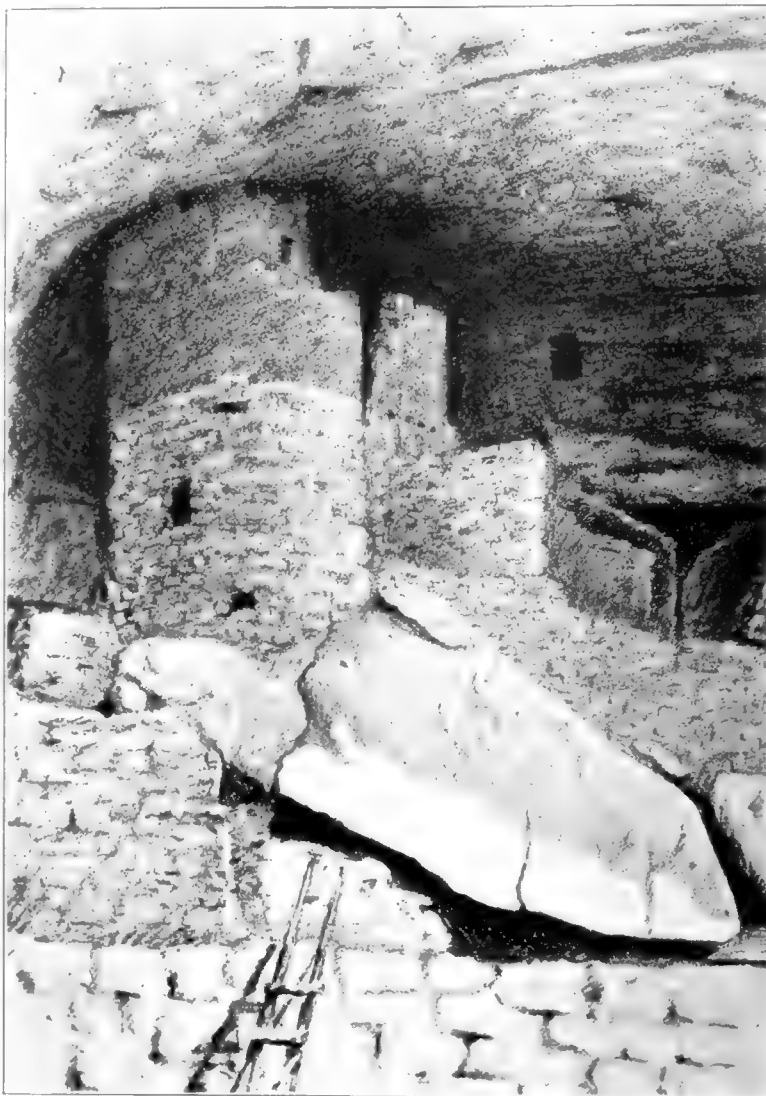
Why our Federal Government has neglected to secure better facilities or to even adequately preserve the relics of these ruins has been a question frequently discussed.

Baron Nordenskjold, the great Swedish anthropologist, visited Mesa Verde in the later eighties or early nineties and took therefrom not only the impressions for which he came, but also most of the loose implements, bits of pottery, feather cloth and other evidences of that form of civilization which obtained amongst the Cliff Dwellers. What little he left has since been scattered amongst the residents of the district so that by the time the National Park was created, there was little left for the tourist to study. If a museum consisting of small structures containing a few glass cases which might cost, perhaps, so much as \$2,000, could be squeezed from an annual billion-dollar budget, the residents of the district who have collected these curios would willingly lend them for exhibition, but to date the plea of this wonderful Park for some means of preserving its relics has gone unheeded.

Why the district has not received more attention on the part of tourists and the lovers of antiquity has been a mystery that is only second to the mystery of the ruins. Thousands of people annually

spend their money in pursuit of the lure of antiquity. Most of them are not familiar with the fact that the oldest living thing on earth and the oldest ruins in the world are on this continent. Time, in its backward stretch, seems to reach the limit of human appreciation along about the time the pyramids were built in Egypt, yet if those who travel, looking for the relics of antiquity, but knew this wonderful country, I feel certain that more of their time would be spent at home.

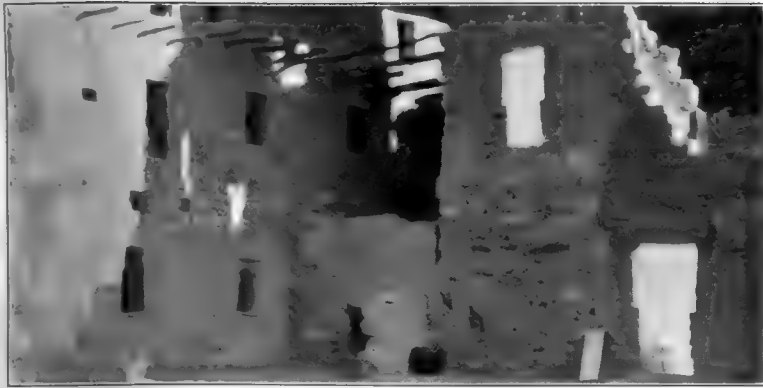
Much has been written of the romance of the desert, and as a result tourists visit Egypt and the barren wastes of Northern Africa with their eyes blinded to the fact that



Lithograph pencil sketch by Mark Daniels.

THE SPEAKER CHIEF'S TOWER

From the second floor terrace the chief is presumed to have addressed his people from time to time. The terrace is about 15 feet square, and commands a view of the entire village. The lower portion is semicircular on one side. The upper is rectangular and provided with loopholes, at which guards were stationed, no doubt, to protect their chief from any little interruption by stones or arrows projected by a disrespectful auditor. The pencil seemed to be the only instrument that would show the details in these deep shadows.



Photograph by Mark Daniels.

A TYPICAL HOUSE

The strong sunlight and intense shadows at this altitude introduce difficulties in photography. It was not an easy matter, therefore, to secure a picture of these cedar rafters and the queerly shaped doorways. The ledges at either side of the doors are at the height of the hand, and were used as a rest to help lift the body over the door sill. The round, black object is a clay vessel of unusual lightness, blackened by fire.

similar fascinations exist at their very door, enhanced by the absence of an intolerable climate. I would not appear to speak disparagingly of the glory of the desert's fascinations, nor of life along the Nile and the thrills



Photograph by Mark Daniels.

A TOWER OF SPRUCE TREE HOUSE

If this were the entire ruin in the cave, the name of "house" might be justified. There are, however, over a hundred rooms in this ruined village which throws the name of Spruce Tree House into the class of misnomers. The tower here shown bears on its side one of the rare examples of primitive efforts toward mural decoration. The light "T" on the wall in shadow is painted.

that come to him who travels in the Holy Land. These are all part of the world traveler's field, and are a blessing to those who may enjoy them. I resent the fact, however, that those places in the old country have occupied a position in the public eye that has excluded the vision of similar wonders in their own country.

TREES CURE THEIR OWN WOUNDS

WHEN a bullet or any foreign body penetrates a tree not sufficiently to kill it, the wound cicatrizes almost in exactly the same way as a wound on the human body heals. If it did not, destructive microbes would enter and cause decay of the tissues.

"Trees," writes Henri Coupin in *Nature*, "are very well equipped for healing their wounds, and, more fortunate than we, an antiseptic dressing is almost auto-

matically applied. As soon as the lesion has taken place the vegetable reacts to the wounded spot. Its breathing at this point is quickened, and at the time time protein matters are rushed to the scene.

"Many plants are provided with secreting canals filled with more or less gummy substances, which are instantly poured out over the wounded surface and protect it. This is true especially of the conifers—pines, firs, etc.—of which the resin makes a swift and impermeable antiseptic dressing."

In trees that have little or no resin the wounded part turns brown. This is due to the appearance of a juice that seems to be a mixture of gums and tannin. And the cells of the tree start into activity, proliferating and filling up the cavity with new cells. If the wound be large, these take the form of vegetable cicatricial tissue, which makes a plug and remains as a scar. In the event that the wound be confined to one of the limbs of the tree, it not infrequently happens that the limb becomes dead and drops off, the wound healing and leaving the tree nowise the worse for the loss of the absent member.

FORESTRY ASSOCIATION OFFICERS

AT the recent annual meeting of the Northern Montana Forestry Association the following officers were elected:

President—C. A. Weil, Eureka, Montana.

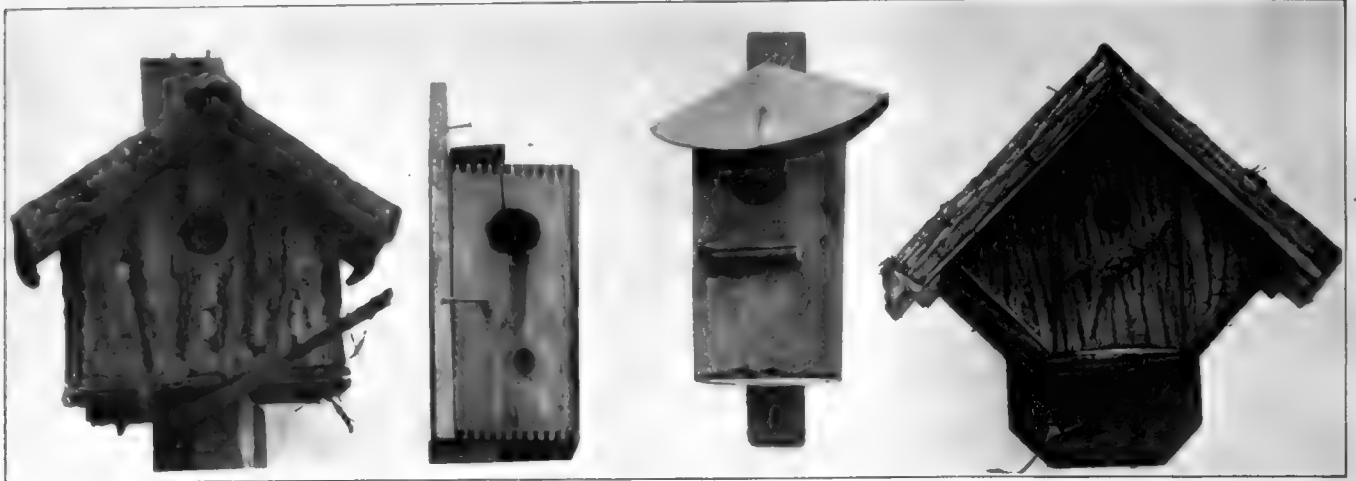
Vice-President—W. R. Ballord, Somers, Montana.

Secretary and Chief Fire Warden—A. E. Boorman, Kalispell, Montana.

Board of Directors—C. A. Weil, Eureka; W. N. Noffsinger, Kalispell; C. B. Roberts, Fortine; W. R. Ballord, Somers; A. E. Boorman, Kalispell; M. Driscoll, Kalispell; C. D. Conrad, Kalispell; John R. Toole, Bonner; John C. Van Hook, Helena, and C. B. March, Kalispell.

PUBLIC USE OF NATIONAL FORESTS

THERE were 18,342 special-use permits in force on the National Forests on June 30 last, according to figures just compiled by the United States Forest Service, to show the varied uses to which the public is putting the Government land involved. The list includes 59 apiaries, 2 brickyards, 31 canneries, 39 cemeteries, 9 churches, 1 cranberry marsh, 32 fish hatcheries, 1 golf link, 43 hotels, 1 astronomical observatory, 10 fox and rabbit ranches, 1,085 residences, 74 resorts and club-houses, 3 sanitariums, 500 sawmills, 163 schools, 9 slaughter houses, 57 stores, 16 municipal watersheds, and 182 water-power sites, with many other uses. Fees collected on 7,895 of these permits contributed a total of \$175,840.40 to the general Forest revenues, but 10,447 of the permits were issued without charge.



HOME-MADE BOXES

These two wren boxes are correctly built. One is adorned with bark, the other is made from a chalk box. The diameter of the openings is $1\frac{1}{2}$ inches.

COMMERCIAL BIRD HOUSES

One of these is made of roofing paper by the Winthrop Packard Co., of Canton, Mass., and one from rustic cedar by A. P. Crescent, of Tom's River, N. J.

The Bird Department

By A. A. ALLEN, PH.D.

Assistant Professor of Ornithology, Cornell University

HOW TO ATTRACT THE SUMMER BIRDS—BIRD HOUSES

THOSE who have been feeding the birds during the winter and have enjoyed the friendliness of chickadees, nuthatches, and woodpeckers at their windows; those who welcome the return of the birds in the spring and know the mellow call of the bluebird and the bubbling song of the wren; and those who enjoy the knowledge that their property is being guarded against the attacks of insect pests, will all be interested in trying to tempt these little wayfarers to the vicinity of their homes.

The making of bird houses is an old, old story, but like many other classic tales, it will bear retelling. The original idea was simple enough, but of recent years it has been encumbered by so many suggestions that people hesitate to undertake what really is an easy task. For the more simple the box the more natural will it appear and the more attractive will it be to the birds.

There are over 50 species of birds in the United States and Canada which utilize holes in trees for nesting, including many of the most useful. The borer-destroying woodpeckers, the larvae-destroying nuthatches, the egg-destroying chickadees, the mosquito-destroying tree swallows—all build in holes in trees and may be attracted to nesting boxes. But in these days of scientific forestry when every dead tree is condemned, and every dead branch lopped off by the "tree-doctor," their natural nesting sites are rapidly disappearing and their numbers are correspondingly decreasing. It is the wise timber owner, therefore, who puts at least one nesting box in the place

of every dead tree which he removes. The chickadees and woodpeckers which are with us in winter and the wrens and bluebirds that return in the spring will move on unless they find plenty of nesting sites.

Of the fifty or more hole-nesting birds, a comparatively small proportion have learned yet to accept the artificial nesting site, only nine species taking them regularly and nineteen more utilizing them occasionally. It is to be expected, however, that eventually all the species will learn to adapt themselves and perhaps even others will so modify their present nesting habits as to accept artificial structures. This has proved to be the case in the celebrated experiments of Baron Von Berlepsch where out of a thousand nesting boxes placed on his estate, birds have gradually been induced to occupy over 900.

The species which regularly use nesting boxes are as follows:

House wren (and all its sub-species), bluebird (eastern and western varieties), chickadee (northern and southern sub-species), purple martin, tree swallow, flicker, violet-green swallow (western), house finch (western), Bewick's wren, English sparrow and starling.

The species which occasionally use nesting boxes are as follows:

White-breasted and red-breasted nuthatches, downy woodpecker, hairy woodpecker, red-headed woodpecker, tufted titmouse, Carolina wren, crested flycatcher, screech owl, saw-whet owl, barn owl, sparrow hawk, wood duck, song sparrow (rarely), and dipper (western).

The species reported as having used covered shelves, opened at the sides, are robin, phoebe, and barn swallow.

HOW TO MAKE THE BIRD HOUSE

To begin with, the word "house" is a misnomer, for the less houselike the bird box, the more practical will it prove. The fanciful doll houses with several compartments, chimneys, frescoes and verandas, while occasionally used by English sparrows or martins, are usually very ineffective, and, of course, entirely out of place. The more it is like the old hollow limb in the orchard or the hole in the fence post, the more pleasing to the eye of the bird will it be.

The best materials to select in building bird houses are weathered boards, rustic cedar, or slabs of wood with the bark adhering. Smoothly planed boards should be avoided. Gourds, when obtainable, can be made very acceptable by cutting a hole of the proper size in one side, cleaning them out and drilling a small hole in the bottom to drain off any rain that may beat in. Tin cans may be used, but should be painted or covered with bark to make them less unsightly. One end should be replaced by a block of wood and the opening of the proper size should be made toward one edge of this or in one side of the can. Green bark of chestnut or other trees can sometimes be secured and nailed into the form of a hollow cylinder. A hollow limb, a deserted woodpecker's



CHICKADEE AT ITS NEST

The home of this little fellow is in a hole in a stub. The chickadees will use nesting boxes, when they are properly built, and it is a wise tree-owner who puts up at least one nesting box for every tree he cuts down. Now that dead trees and branches are cut, the birds have no easy time finding natural homes in dead or dying trees.

nest, or a block of wood hollowed out in the form of a woodpecker's nest are all good devices, but usually it is easier to cut rough boards into the proper lengths and nail them together securely in the form of a small box. Sometimes boxes of the proper size, such as chalk or starch boxes, can be found ready made and require only some reinforcement.

The exact size of the box is not very important except that it should not be so large as to waste lumber, nor yet so small as to give insufficient room for the nest. A box should never be smaller than 3 1/2 x 3 1/2 x 6 inches, inside measurements, and it would be better to make

it somewhat larger even for wrens. One putting up bird boxes for the first time would do well to make them of average size so that they will be acceptable to the greatest variety of birds. In this way the chances of attracting them are increased. Such a box would measure 5 x 5 x 12 inches with the long axis vertical. If special effort is to be made to attract flickers, screech owls or sparrow hawks, boxes 6 1/2 x 6 1/2 x 24 inches should be made. If martins are desired a house of 10 to 30 compartments should be constructed with each compartment 6 to 8 inches square. Rows of gourds tied to cross pieces and raised on poles will likewise attract martins and are extensively used in the South. If one wishes to build a large martin house, explicit directions can be obtained from Farmers' Bulletin No. 609, of the U. S. Department



BIRD HOUSES OF LOGS

These are manufactured by the Audubon Bird House Company, of Meriden, N. H., by hollowing out sections of logs. The largest size is for flickers and screech owls, the smallest for wrens, the intermediates for chickadees, nuthatches, bluebirds, tree swallows, and downy woodpeckers.

A MARTIN HOUSE

This is occupied by many pairs of these swallows. Each compartment is from five to eight inches square and the openings about 2 1/2 inches in diameter. Martin houses are the only ones which should be built with more than one compartment with the openings near the floor.

INCORRECTLY BUILT

These bird houses are not properly constructed. In one the opening is at the bottom instead of two inches from the top; in the other the opening is much too large.

of Agriculture, entitled "Bird Houses and How to Build Them." All other birds' houses should be built with only one compartment.

The size and position of the opening are much more important than the exact size of the box. A round hole is the best, and, except in martin houses, should be cut above the middle line on one side and preferably about two inches from the top. All hole-nesting birds, except the martin, wish to be out of sight from the entrance while incubating.

If there are not many sparrows or starlings about, it will be better to make the openings in all the boxes, except those for the largest birds, $1\frac{1}{2}$ inches in diameter. This will admit birds up to the size of the bluebird and tree swallow, and is not large enough to be objectionable to the wrens and chickadees. If sparrows

are numerous, however, one can keep them out of the boxes and still admit the smaller species by making the opening $1\frac{1}{4}$ inches in diameter.

A table of the proper diameters for the openings of bird houses (for the different species of birds) as given by Mr. H. K. Job is as follows (where two figures are given they represent the maximum and minimum sizes which are correct):

- a. $1\frac{1}{8}$ inches: house wren, Bewick's wren, Carolina wren, chickadee.
- b. $1\frac{1}{4}$ inches: white-breasted nuthatch, tufted titmouse.
- c. $1\frac{1}{2}$ to $1\frac{5}{8}$ inches: bluebird, downy woodpecker, crested flycatcher, tree swallow, violet-green swallow.
- d. $1\frac{3}{4}$ to 2 inches: red-headed woodpecker, hairy woodpecker.
- e. $2\frac{1}{2}$ inches: flicker, saw-whet owl, purple martin.
- f. 3 inches: screech owl, sparrow hawk.
- g. $4\frac{1}{2}$ inches: barn owl, wood duck.

NESTING MATERIAL

No nesting material in the form of straws, feathers or sticks should be placed in the box. This would discourage rather than encourage prospective tenants, for they always rent unfurnished. In flicker and other woodpecker boxes there should be placed in the bottom a



A HOME FOR THREE SUCCESSIVE YEARS

Wrens have returned to this box for three years, and are expected to do so for many more. The last young wren of the new family is seen leaving the nesting box.

because the woodpeckers build no nests and must have something to keep the eggs from rolling about. A layer of sawdust will do no harm in any other box, but is not necessary.

PLACING THE BOX

Quite as important as the size and position of the opening is the selection of the place to put the box. It is possible to put up ten or fifteen boxes and have nothing but house sparrows nesting in them, when, if properly placed, they would be occupied by several pairs of wrens, swallows or bluebirds. If several boxes are put up, they should be at least 25 feet apart and preferably farther. These native birds are not socially inclined toward other hole-nesting species, and drive away all others from the immediate vicinity of their established domain. If one examines the natural nest-

ing cavities of any of these birds, he will find that with few exceptions they are in the open places in bright sunlight or light shade, and never among the thick branches of a tree or in dense shade. The best place, therefore, is on a pole 8 to 12 feet from the ground in an open space or at the edge of trees facing the open. A post on the porch or the unshaded side of the house will also serve if the box is made to face out. House wrens and nuthatches are the exceptions that will sometimes use boxes placed in dense shade. The trunk of a large tree, a telegraph pole or a high fence post are other places which will prove satisfactory, although perhaps not quite so much so as the separate post. An excellent place for the large flicker or sparrow hawk box is the top of the stub of a tree whose upper branches have died and been cut away.

CARE OF THE BOX

If a box is well made and once in position, it need never be moved. Frail or fancy boxes should be taken in each fall and replaced in March. Cleaning a box is not necessary under ordinary circumstances, as the birds will do their own renovation, but it is well to have the top or one side hinged, so that one can get at the inside if necessary, to throw out the nests of sparrows or squirrels or caterpillars, or to clean out the box in case anything happens to the old birds so that the young die. Aside from this there is little need of care and at the

end of the season the old nest can be thrown out or left in, it making little difference to the birds when they return the following spring. The lice which often infest the nests of wrens are harmless and die soon after the young leave.

BIRD HOUSES AND FORESTRY

Mention was made above of the estate of Baron Von Berlepsch, where over 90 per cent of a thousand boxes have been occupied by birds. He has experimented, like-

protecting the forests by attracting and increasing bird life that the German government adopted his method, and now there are in every forest numbers of bird houses and food shelters. Many species that did not at first use the boxes have learned to do so and each year the offspring hatched in the boxes are continuing and strengthening the newly formed habit. In this country similar experiments are being started and many estates now boast of hundreds of nesting boxes inhabited each year by an increasing number of these indispensable guardians of the forests.



A WREN TAKING FOOD TO ITS YOUNG

This box measures 4 x 5 x 7½ inches, and is about the right size for wrens or chickadees. Great care should be taken to see that it is properly placed. The boxes should be at least twenty-five feet apart, as native birds are not socially inclined toward other hole-nesting species, and drive away others who trespass upon their preserves.

wise, in planting the shrubbery most attractive to birds for nesting sites (such as hawthorns and berry bushes) and has pruned young trees so as to increase the number of available sites. In this way and by keeping down the numbers of bird enemies and by feeding the birds in winter he has been able so to increase the numbers of birds nesting on his estate that when all the adjacent country was swept by a plague of insects, his estate was the one green spot on the landscape. So convincing was the demonstration of what was possible in the way of

BIRD LIFE IN MARCH

March is the month of awakening. The snows melt, patches of green appear and spring is in the air. Not the spring that speaks of summer at hand, but hours of promise and days of disenchantment. But the long siege of winter is over and man and the animals feel the impulse to move. It is now that that mysterious instinct to migrate begins its powerful sway in the realm of birds, that instinct which impels many species to travel thousands of miles and gives no rest until the journey is accomplished.

Some species have not retired far south and when the instinct is aroused, it drives them close behind the receding snows. The horned larks came back in February, the robins and bluebirds follow the first warm days of March, and soon will come the blackbirds and grackles. The geese go honking northward when they know the wheat fields are bared and the lakes once more open, and following in their wake are the phoebe, meadowlark and killdeer. Before the month has run its course the Northern States will echo with the rattling call of the kingfisher and the sweet notes of the mourning dove and white-throated sparrow, while the Southland will begin to welcome the more adventurous of the travelers returning from the tropics, redstarts, yellow warblers and the black and white creeper being among the first to come.

The early birds are less regular than the warblers and orioles of May, whose arrival we can predict quite accurately. The weather is less settled and storms will delay them. But March is a month of promise and the hardier the adventurers, the more we welcome them.

SAMPLE COPIES OF AMERICAN FORESTRY

MEMBERS of the American Forestry Association having friends interested in trees, woodlands and forests are urged to send their names to the association, and a sample copy of the magazine, *AMERICAN FORESTRY*, will be sent to them with the compliments of the member.

Have you invited a friend to become a subscribing member?

Kraft Paper and its Uses

By W. R. BROWN

THE many new and useful articles which are being manufactured out of paper, and more particularly out of Kraft paper, are of interest on account of their unusual character, and because they represent reduction in the cost of living and a close utilization of forest product, with its attendant beneficial effect on forestry. As is usual in matters of close utilization, foreign countries have been the pioneers in the use of wood fiber, and many of the products which are the subjects of illustration are of Scandinavian manufacture. Their manufacture in this country will no doubt only be a matter of a short time, and open a wide field for profit.

The process of manufacturing sulphate pulp, from which Kraft paper is made, originated some twenty years ago in Sweden, and for some ten years was carried on in Sweden, Norway and Finland before being introduced into this country. The first mill for manufacturing sulphate pulp on this side of the Atlantic was established by the Brompton Pulp and Paper Company, at East Angus, Quebec, and they still continue one of the large producers, being exceeded only by the Wyagamac Pulp and Paper Company, at Three Rivers, Quebec, and the Brown Corporation, at La Tuque, Quebec.

Briefly, the process is what is known as the soda ash process to distinguish it from the sulphite process, the main points of difference being that the principal chemical used in the sulphate process is sodium sulphate, commonly called salt cake, which is mixed with chloride of lime to form caustic soda, and this, when reduced by heat, forms sodium sulphide carbonate, commonly known as black ash.

Sulphate pulp is sold to paper manufacturers throughout Canada and the United States, and there are thirty or more mills using this pulp which produce a little over a thousand tons of Kraft paper daily.

The distinguishing characteristic of Kraft is its extreme strength and resistance to wear by folding, due to the gentle action of the chemicals, which disintegrate the cellulose from the lignin and preserve the long fiber of the wood. It is of the brown color which is so often seen in wrappings for parcels or magazines. The tensile strength of this paper in comparison with other manilla wrappers of equal weight and thickness is from one-quarter to one-half greater. On account of the marked superiority of Kraft, many imitations have been put upon the market, but a return to the use of the original has almost always followed. While the price of Kraft is somewhat higher for wrappers per pound, the customer secures nearly half again additional area and a much stronger and more serviceable paper.

Large quantities of Kraft paper are used in the department stores, and particularly by the large mail-order

houses in the West who ship by parcel post. It is particularly suitable for envelopes, especially such as are manufactured for heavy documents and money, in place of leather-board containers. Strips of Kraft paper are used in binding the corners of cardboard boxes, particularly shoe boxes. Strips of gummed Kraft paper are used in the same manner as twine about boxes and packages, and are much stronger and do not slip off. Even coal is now being delivered in bags made of Kraft in place of canvas bags which had to be emptied and returned, the paper bags being merely burned up with the coal. With a light backing of cloth fiber and a filler against dampness, Kraft paper, called "Watershed," is used for covering automobile tires for shipment in place of burlap. "Watershed" paper is also used for the oversea shipment of dry goods and groceries. Kraft cardboard is used in the manufacture of dress suit cases. Embossed Kraft paper is used for wallpaper, book covers, and for covering fancy boxes. Very good imitation leather is made from Kraft. Stripped into narrow rolls one-eighth of an inch wide, it is run through a machine which gums one side. The gummed side is spread with a fine lint of cotton or linen. These strips are then run in a spinning machine and twisted into threads, from which the cotton and linen fibers protrude as a thin fuzz. This thread is afterward woven into various fabrics, as imitation burlap for wallpaper, cloth for upholstering furniture, grain bags, tailors' lining for suits, imitation cotton and linen towels, webbing, straps for surcingles, bedding, etc. By the introduction of colored thread and stamping in colors, pleasing designs are worked into the fabrics. Small twine made of twisted Kraft paper is used for tying up bundles; is woven into coarse mattings, and furnishes the warp for cheap rugs and carpets. Twisted into many strands, it is woven into all sizes of rope, particularly laundry and window rope and binder twine for harvesting machines. To add strength, it is sometimes spun on a hemp core. One piece of rope of Kraft paper has a breaking strength of 28 pounds and runs 383 feet to the pound; another has a breaking strength of 24 pounds and runs 750 feet to the pound; a third has a hemp center, a breaking strength of 43 pounds and runs 642 feet to the pound. Kraft paper is also now being used as insulation in the wrapping of overhead and underground copper cables.

By a new patented process, the Berlin Mills Company is now producing paper pipe wound over cores of various diameters and made in various thicknesses, which is thoroughly permeated with a tar compound, forming a strong, compact pipe capable of taking a thread and lighter and less expensive and more durable than iron pipe. This is used for various purposes, such as under-



SOME OF THE ARTICLES MADE FROM KRAFT PAPER

Heavy Kraft twine; Kraft yarn; fancy Kraft rope, spun on hemp core; flag, laundry, window and cable rope of Kraft; rattan filling of Kraft shellacked for table; Kraft webbing for various purposes; overhead and underground high-power copper wire cable insulated with Kraft paper; coarse mattings of Kraft; Kraft upholstery fabric; Kraft pipe, with thread joints; plain and colored Kraft twines; embossed Kraft; printed Kraft burlap; fine Kraft mattings, printed, interwoven and leather bound; medium mattings of Kraft; Kraft toweling.

ground conduits for electric wires and for resisting the action of various corrosive acids, especially in coal mines.

Kraft paper could be easily adapted to the same use discovered by a Japanese during the Russian war, who invented a soft, tough and waterproof paper which was used as a pellicular peignoir. They also made it into paper sheets which could be folded into a small package and which would keep out dampness. There are other uses for this paper, such as for napkins, handkerchiefs, paper plates, cups, pails and other articles too numerous to mention, but the most surprising use it has been put to is that one-eighth-inch strips, shellacked and twisted, are used in manufacturing articles of furniture in the place of or in conjunction with rattan, such as chairs, tables and baby carriages. So it would appear that there was a profit in changing wood into pulp, making the pulp into paper, and turning the paper back again into wood.

T. C. LUTHER CUTS LARGEST ELM

ONE of his lumber jobs in the town of Putnam, Washington County, New York, and within sight of the historic Fort Ticonderoga, T. C. Luther, of Saratoga Lake, has had cut and drawn to his sawmill, located on the shore of Lake Champlain, an elm tree that will make 5,600 board feet of lumber.

The trunk of the tree measures 68 feet to the limbs, is 60 inches in diameter at the butt and 27 inches at the top, which, by Scribner's log rule, will cut 5,100 feet, and some of the limbs, which are as large as good-sized trees, will cut 500 feet more, making a total of 5,600 feet.

There was so little taper to the tree that the first two 12-foot logs will cut 1,334 feet each. A rare thing in a tree of this size is that it is perfectly sound and without a check or blemish on the surface the entire length of the trunk.

The rings of the tree indicate it is 720 years old, which shows it started long before the discovery of America.

On account of its enormous size, the ordinary sawmills that are in common use nowadays cannot manufacture it into lumber, and Mr. Luther is now making special arrangements for manufacturing this and some other extremely large logs he has in stock.

Foresters and lumbermen who have seen this tree in the mill yard pronounce it the finest and largest specimen of the elm they have ever seen.

PRIZES FOR FORESTRY ESSAYS

THE Kentucky State Board of Forestry is offering prizes for essays by the children of the public schools on forestry. The special subject set for this year is, "A Plan for Beautifying the Grounds of the School by Planting Trees and Shrubs." Prizes of \$12.50 and \$7.50 are offered for high school students and similar prizes are offered for the grade pupils. The grading is to be based on English, 40 per cent; selection of species of trees and shrubs, 30 per cent, and maps and sketches, 30 per cent.

WHAT MAKES "BIRD'S-EYE" MAPLE?

AMERICAN FORESTRY was recently asked, "What makes bird's-eye maple?" And more than one reader will be interested in knowing. Though the figures of few woods are better known, the cause of the bird's-eye has been the subject of interminable guessing and theorizing. It has been accounted for in more ways than nearly any other phenomenon of the forest. The favorite theory has been that sapsuckers, by pecking holes through the bark of young maples, make scars which produce the bird's-eye figure in the wood during succeeding years. Bird-pecked hickory is often cited as an analogous case, yet who ever saw bird's-eye figure in hickory, though the bark may have been perforated like a collender by the bills of energetic sapsuckers? The effect in the case of hickory is the opposite of bird's-eye in maple; the wood is discolored and unsightly.

Some account for the bird's-eye figure by attributing it to the action of frost, but the connection between cause and effect has never been shown to exist, even by the most ardent advocates of the theory.

The explanation of the phenomenon is simple, and a person with a good magnifying glass can work it out for himself. The bird's-eye figure is produced by adventitious buds. These have their origin under the bark of the trunk. The first buds of that kind may develop when the tree is quite small. They are rarely able to force their way through the bark and become branches, but they may live many years just under the bark, growing in length as the trunk increases in size, but seldom appearing on the outside of the bark. If one such bud dies, another will likely rise near it and continue the irritation which produces the fantastic growth known as bird's-eye. It is said that the Japanese produce artificial bird's-eye growth in certain trees by inserting buds beneath the bark. The Field Museum, Chicago, has a sample of what is claimed to be artificially produced bird's-eye wood from Japan.

CANKER WORMS AFTER ELM TREES

CANKER worms, which within the past few years have killed thousands of elm trees in Kansas, are again active, according to S. J. Hunter, professor of entomology in the University of Kansas.

The best treatment to halt the ravages of the little pest, Professor Hunter says, is to bind the trees with a layer of cotton to fill the crevices in the bark, and outside of this wrap a layer of stout tar paper, tying it firmly. Cover the paper with some sticky substance that will stop the spiderlike creatures in their upward course.

The insects will have finished their upward course on the trees by the first week in February, Professor Hunter says, but unless the trees are looked after immediately they will be all over the branches in a few days.

The National Forests

BY HON. D. F. HOUSTON,

Secretary of Agriculture

NEARLY 25 years have passed since the first public timber reservation was made and 10 since the National Forests were put under the Department of Agriculture. Sufficient time has elapsed to determine whether their creation was wise.

The principal purpose in establishing the Forests was to secure sound economic and industrial development.

Experience had shown that private ownership of large areas of timberland in most instances involved a sacrifice of public interests. Many private investments in forest lands are made for the mature timber and not for the purpose of growing new tree crops. The long time required to raise a merchantable product, the risk of loss from fire and other destructive agencies, the fear of burdensome taxes, and the uncertainty of market conditions usually make the holding of cut-over lands unattractive to capital. Hence, the peculiarly public character of the problem of forestry.

Before the National Forests were created practically

no effort was made to protect the timber on public lands from destruction by fire, notwithstanding the fact that the situation was peculiarly hazardous. During the last decade a fire protective system has been developed. Extensive improvements have been made, including more than 25,000 miles of roads, trails, and fire lines, 20,000 miles of telephone lines, many lookout stations, and headquarters for the protective force. In the year 1914, when conditions were exceptionally unfavorable, nearly 7,000 fires were fought successfully. They threatened bodies of timber valued at nearly \$100,000,000, but the actual damage was less than \$500,000. This work not only is saving public property; it is conserving the material for local economic development and for permanent industry. Furthermore, the results of the Federal system have induced many States to take up the work, and active cooperation between the two agencies has followed.

The service rendered by the National Forests is not confined to protection from fire. The resources are being



NATIONAL FOREST NURSERY IN CALIFORNIA

Mount Shasta in the background. Forest renewal is generally obtained through natural reproduction, but planting stock for artificial reforestation work is grown in various nurseries, with a total capacity of 10,000,000 seedlings yearly.



AGRICULTURAL VALLEY BOTTOM IN THE MOUNTAINS

It is the Department's policy to make available for settlement all lands which are chiefly valuable for farming. Those not chiefly valuable for agriculture are retained in public ownership.

utilized to build up the country. They furnish the timber required by settlers, communities, and industries within and near their borders. More than half of the timber now cut annually is used in the vicinity of the Forests. This includes all that taken free and under sales at cost, and approximately 45 per cent of the commercial cut. Hundreds of mining districts throughout the West, from small projects requiring an occasional wagonload of props or lagging to the great copper district of central Montana, which consumes about 380,000 pieces of mining timber annually, are supplied. Railroads also are furnished a large part of the ties and other material required for their lines in the Rocky Mountain regions. A million and a half ties now are cut from the Forests yearly. Throughout the West tim-

ber is taken from them for nearby towns, irrigation projects, hydroelectric power plants, and the like, while thousands of individual settlers obtain it for fuel and farm improvements. On the Alaskan coast the salmon packers, towns, and settlers use 40,000,000 feet a year from the Chugach and Tongass Forests.

The National Forests also meet the demands of the general lumber market. More than 300,000,000 feet are cut annually for the nation-wide trade. Since 1908 there have been taken from them 5,000,000,000 board feet of wood and timber products.

Not only is timber amply supplied and future resources safeguarded, but the ultimate damage to the West through impairment of its water resources, vitally important for irrigation and other purposes, also is pre-

vented. The damage would have been of a kind to force at a huge cost the undertaking of protective works against erosion, torrent formation, and floods. Other countries have been compelled to do this. At the time the National Forest policy was entered upon the agencies making for destruction were actively at work. A range overgrazed and forest fires which burned unchecked were diminishing the water-storage value of the mountains and accelerating soil destruction and removal. The evils averted and the benefits secured through only a decade of protection and regulated use constitute a gain of great moment.



RANGER COUNTING AND MARKING RAILROAD TIES ON A NATIONAL FOREST
TIMBER SALE

floods in the Rocky Mountain region with a large part of the ties and other material required for their lines.

Although the National Forests were established primarily to conserve the timber and to protect the watersheds, it has been the consistent aim of the department to develop all other resources.

Grazing, mining, agriculture, water power, and recreation—all are fostered. One of the most important of these is grazing. The greater part of the summer range in the Western States is in the Forests. Under the regulated system the forage is utilized fully, without injury to the tree growth and with adequate safeguards against watershed damage. There were grazed last year under pay permits 1,724,000 cattle and horses and 7,300,000 sheep and goats. Several hundred thousand head of milch and work animals were grazed free of charge, and more than 3,500,000 head of stock crossed the Forests, feeding en route, also free of charge. Not including settlers who have the free privilege or persons who have only crossing permits,

greater than it was 10 years ago. Since 1905 the number of persons holding grazing privileges has increased nearly 200 per cent. This is due in part to the enlarged



MOUNTAINEERING MADE EASY

Climbing Pike's Peak by auto. The National Forests are open to the whole nation for health and recreation. They embrace the high, rugged mountains of the West, the scenery of which is unsurpassed.



FOREST OFFICER TALLYING SHEEP AS THEY ENTER A NATIONAL FOREST

It is probable that a hundred million pounds of beef and mutton are sold each year from herds and flocks occupying the forest ranges. Grazing is regulated with a view both to range conservation and to community growth and diffused prosperity. In other words, public control serves social as well as economic ends.

there are 31,000 individuals who have regular permits. During the year ended June 30, 1905, there were only 692,000 cattle and horses and 1,514,000 sheep and goats on 85,627,472 acres. The number of animals now sustained in proportion to the area of the Forests is 50 per cent

area of the Forests, but can be attributed principally to wider use by settlers and small stockmen. When the regulated system was established the Forest ranges, like the open public lands today, rapidly were being impaired. The productivity of the land for forage in most places has been restored and everywhere is increasing; the industry has been made more stable; stock comes from the Forests in better condition; range wars have stopped; ranch property has increased in value; and a larger area has been made available through range improvements. It is probable that 100,000,000 pounds of beef and mutton are sold each year from herds and flocks occupying the ranges. That the Forests have promoted the development of the stock industry is indicated. This is appreciated by stockmen and they are urg-

ing that a similar system of range regulation be extended to the unreserved public lands. But it is not merely the stock industry that has been benefited. The grazing privilege has been so distributed as to promote healthy community growth, increase settlement, prevent monopoly,

and diffuse prosperity. In other words, public control has served social as well as economic ends.

The National Forests contain approximately one-half of the water power of the West. The department for nearly a decade has been issuing permits for its development. Unfortunately, the present law does not authorize the granting of permits for fixed periods. It should be amended, and recommendations to this end have been made repeatedly by the department. While authority to grant term permits undoubtedly would aid water-power utilization, the fact remains that development, practically to the extent of the market, actually is now taking place

over 1,000,000 more are under permit for future construction. The chief obstacle to further immediate water-power expansion is the lack of market, for plants in operation in the West now have a surplus of power of which they cannot dispose.

The National Forests are open to prospecting and the initiation of mineral locations just as in the open public domain.

The existence of the Forests gives certain advantages to the miner. It is not on the great private timber tracts in the western mountains that the miner is prospecting. It is only on the Forests and other public lands open to

mineral locations, if he makes a discovery that he can get title merely through conscientious compliance with the mining law. Many miners today are securing their timber from the Forests, and because of its protection and continued production a steady supply at reasonable rates is assured.

The National Forests are used also for health and recreation. They embrace the high, rugged mountains of the West, the scenery of which is unsurpassed. These great areas are open to the whole nation. Already more than one and one-half million people visit them annually for recreation, and this number is increasing rapidly as roads and trails are built, making new points accessible. The lands bordering on the hundreds of lakes and streams in the Forests offer attractive sites for camps and for permanent summer residences. Authority now exists to grant term leases for the erection of summer homes, hotels, and

similar buildings, and large numbers will take advantage of this privilege. Public ownership has protected the natural beauty of these areas. Their recreational value has been maintained and increased through road and trail construction and through intelligent study of the needs of the public.

To the agricultural interests of the West the proper handling of the Forests is of great importance. The Forests conserve and increase the supply of water. Fire protection gives property an added value, as do roads, trails, and other Government improvements. In fact, the existence of the Forests gives a permanence to agriculture that does not exist where the timberlands are privately owned.

What has happened in the older lumber regions of the country is well known. The scattered agricultural areas were occupied as long as the timber lasted and lumbering



DEVELOPING COMMUNICATION ON A NATIONAL FOREST

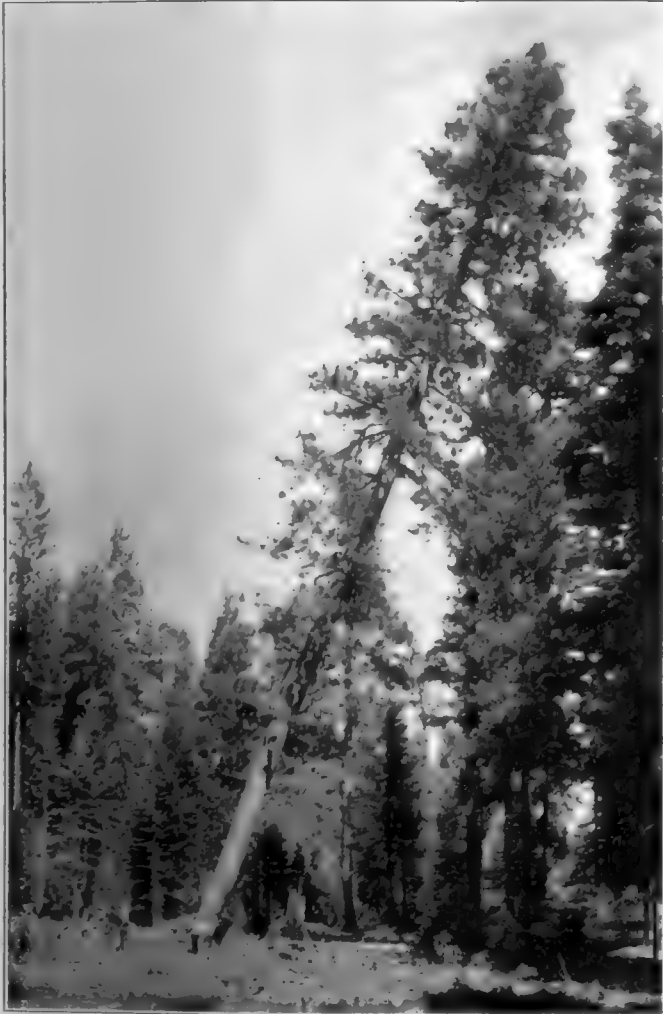
Rangers constructing a bridge. Public ownership carries with it responsibilities to aid in community upbuilding through road work in undeveloped regions.

on the Forests. In the Western States power development has advanced proportionately very much more rapidly than in the East, where land is privately owned. The amount of water-power used in the generation of electricity by public utilities corporations, street railway companies and municipalities has in the last decade increased 440 per cent in the West, or more than twice as fast as in the remainder of the country. There, in proportion to population, four and one-half times as much water power is used as in the remainder of the United States, and nearly three times as much as in the Eastern States.

Of the existing 1,800,000 water horsepower in the Western States, 50 per cent is in plants constructed in whole or in part on the Forests and operated under permit from the department. Plants under construction will develop about 200,000 additional horsepower, while

operations furnished markets, kept up roads, and gave employment when the farm could be left. But with the exhaustion of the timber, the devastation of the lands by fire, the abandonment of the logging roads, and the moving of the industry to some new region, the farms, too, were abandoned and whole townships depopulated.

It is the department's policy to make available for



FELLING A GIANT WESTERN YELLOW PINE

Since 1908 there have been taken from the National Forests five billion board feet of wood and timber products. All this timber has been cut in accordance with forestry principles. Young growth has been safeguarded and a new crop provided for.

settlement all lands which are chiefly valuable for farming. In order to open such areas a careful classification is being made. Large tracts found to be valuable for agriculture or unsuited for permanent Forest purposes are eliminated. During the last five years about 14,000,000 acres have been released. In addition, individual tracts are classified and opened to entry upon application of home seekers. Since the work was begun more than 1,900,000 acres have been made available for the benefit of 18,000 settlers.

In short, lands within the Forests really adapted to agriculture are being occupied as homesteads under favorable conditions. While the lands suited to settlement are classified and opened to entry, those which are not chiefly valuable for agriculture are retained in public

ownership. The alienation of timberlands under conditions that will lead not to settlement but to speculation and to increasing the holdings of private timber owners would defeat the very purposes for which the Forests were established.

The real agricultural problem within and near the Forests is to make possible the successful occupancy and development of the lands that already have been opened to entry or actually patented. The mere private ownership of land does not insure successful use of it. In Oregon and Washington alone there are about 3,000,000 acres of logged-off land, much of it agricultural in character, now lying idle. In this condition speculative holding of the land for higher prices plays a large part. Another cause is the lack of transportation facilities. A settler may clear land and raise crops upon it, but he is helpless if he cannot market them. There are great areas of fertile land unused today on this account. In many sections near the National Forests pioneer conditions still exist. The population is small and the task of road building is beyond the means of the residents. There is little or no demand for timber and the receipts from the Forests which go to the community are small. The fact that the public property is not subject to taxation makes such communities feel, and very justly, that the Forests are not contributing enough to local development. This situation should be changed. Assistance should be given in the building of roads to bring into productive use the resources of such regions.

Two of the 155 National Forests are in Alaska. The Tongass comprises approximately 15,000,000 acres in southeastern Alaska, while the Chugach, covering the timbered area about Prince William Sound and thence westward to Cook Inlet, contains about 5,500,000 acres. The volume of timber on the two Forests is estimated to be between sixty and eighty billion board feet, about one-eighth of the total estimated quantity on all the Forests. In accordance with the general principle of organization adopted for all the Forests, but to a greater degree than elsewhere because of their remoteness, the administration of the Alaska Forests is decentralized to permit the prompt transaction of business and ready response to the needs of the public. Approximately 40,000,000 feet of timber are cut annually under sales. Settlers secure free, without permits, the timber needed for personal use. Mining locations are made as on the public domain. Agricultural land is classified and placed at the disposal of settlers. Every encouragement is given to the use of lands for miscellaneous purposes. In some places there is an increasing use of land for canneries, stores, and other enterprises.

FAMOUS ELM TREE CUT DOWN

THE big elm tree in Independence Square, Philadelphia, said to have been planted by King Edward VII of England, when he visited this country as the Prince of Wales in 1861, was cut down a short time ago. The tree had been dead for some time.

Children's Department

Devoted to imparting information about trees, woods and forests to boys and girls so that they may grow to know how necessary trees are to the health, wealth and future of their country.

BY BRISTOW ADAMS

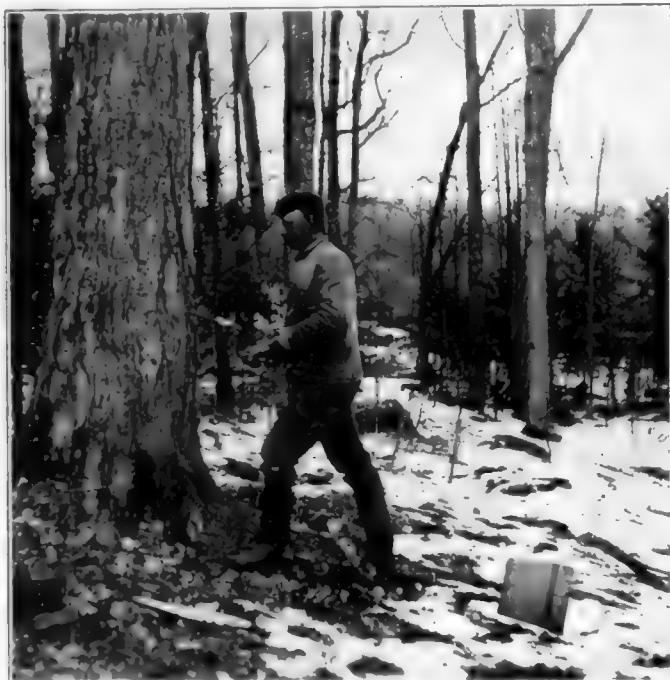
MAKING MAPLE SUGAR

MARCH is the month for maple sugar, so the maple tree is a good one for us to think about at this time.

Maples are to be found all around the world, except in the tropics and in the very far north. In the United States their range is from the extreme north to the extreme south, and hard maple, or sugar maple, forms a large part of our Northern hardwood forest. Florida maple, at the southern extreme, belongs to the soft maple

good deal of white pine and hemlock. In the fall the evergreens appear very dark, almost black, in the midst of their more brightly colored neighbors. The birch is always a flaming yellow, the beech leaves are somewhat coppery, but the maple has all hues, from red to yellow, and adds the more striking color notes to the autumn landscape.

The maple, if any, is the child's tree, both because of the lovely colors which tempt the little ones to carry



BORING HOLE IN SUGAR MAPLE

Into this hole a "spile," either of metal or wood, is driven. Tapping a tree does not hurt it unless a large number of spiles are used in each tree.

type, and its bright leaves are a delight among the darker long-leaf pines with which it grows. About this time of the year, when the sap is beginning to flow with its Northern cousins, its new coral-pink leaves can be seen a long way through the darker pine woods, where they shine almost like a pillar of fire. Later on the leaves turn to green, but even this green is lighter and brighter than all of the surrounding trees, and in the fall the leaves turn back toward the red shades, and in most cases are a brilliant scarlet.

All over its range the maple is noted for the bright colors of its foliage. In the North woods it grows with the yellow birch, among which there is likely to be a



A GROUP OF TAPPED MAPLES

These grow in a pasture convenient to the farmhouse, and yield a goodly supply of sap every spring. The sap runs out through the tapped hole in the tree just as water would run out of a barrel and drips into the buckets.

sprays of the leaves to teacher in spring and fall, and because it is the source of maple sugar and maple syrup. And what child, where the soft maples grow, has not "squirted" the green seeds from the winged "keys," or has not sprayed the sweetish, refreshing juice into his or her mouth?

It is said that the Indians in New England knew how to tap the maple trees and get the sweet sap long before the whites came; but trees had been tapped for sugar by people in the Old World long before America was discovered, so it is hard to tell who gets the praise for starting the American maple sugar industry.

While Vermont is generally thought of as the maple

sugar State, a good deal comes from New Hampshire, New York, Pennsylvania, Ohio, Michigan, Wisconsin, and northern Indiana.



GATHERING SAP IN WOODEN BARRELS

The barrels are chained to a sled, which is shod with wood and so easily pulled over the rough ground and through a grove of maples.

One of the great delights of a child's farm life in these States is when they begin work in the "sugar bush." In fact, a large part of the year has pleasures connected with it. In the first place, there is the work of getting the supplies ready in the fall, and of getting and storing the wood for boiling down the sap. In some places, particularly in the Adirondack Mountains in New York, making maple sugar has become a regular business, with special machinery and large buildings almost like factories, instead of the small sugar sheds of the farm woodlot.

There are many puzzling questions about the flow of sap in trees, and even the scientists do not fully understand it. We have seen how the tree itself is a factory, and how the leaves make and store up more starch than is needed for its growth during the summer, as a reserve supply in the cells of the sapwood or outer layers of the tree.

for early growth and development during the next spring. These outer layers are more full of sap in the early spring than at any other time. After the bright-colored leaves have dropped from the tree in the autumn,



BOILING SAP INTO SYRUP

This is the primitive, old-fashioned method of boiling the sap in open pans. It is, perhaps, the one most familiar to children and the one in which they most delight; for it is more fun to be at the open fire than to see the sap boiling in the modern sugar house.

the roots still go on bringing in water, and the amount of water in the tree keeps growing larger and larger through the months of December, January, February and March until at the end of this time these outer tissues are nearly half water.

Just why this water flows so actively in the spring is not fully known, but it is supposed that it may be due largely to the fact that the water expands with heat, or that the cells become active and exert an actual pressure. Every year around the sugar-boiling fires in the woods the old men who have been tapping trees year after year have discussions as to whether the sap flows up or down, and nobody seems able to decide it. This is perhaps just as well, because there are not too many such good subjects in the world to talk about. Probably the truth of the matter is that the sap comes out of the "spile" from all directions, because water, under pressure, has



TWO THIRSTY SUGAR MAKERS

Where is the child, living where sugar maples grow, who has not, when the trees are tapped, had many a sip of the sweetish, refreshing sap which flows into the buckets?

no choice as to where it will flow, and will go out of any available opening, and sap is mainly water. The sap runs out through the tapped hole in the tree, just as the water would run out of a barrel full of water if a hole were made in the barrel. In other words, there is such a strong pressure inside the tree that a release of that pressure will cause the sap to run toward the hole both above and below.

Tapping a tree does not hurt it unless a great many spiles are used in one tree. The loss of sap from one or two holes is not enough to make any difference. There is a chance that disease may enter the tree through the top-hole, but this is not likely to be the case if the tree is vigorous. Toward the end of the sugar season the sap is not as good as at first. This is because the sap gatherers are not particular to keep their buckets thoroughly clean. A sort of slime will form on the inside of the buckets, and this will give the sap a bad flavor. It is also true that during the latter part of the season, especially when the buds begin to swell, the sap is slightly different from that at first, because food materials other than sugar are being carried in it to supply the needs of the growing tree. The sugar makers know this as "buddy" sap.

Children in parts of the country where the sugar maples do not grow can well envy their more fortunate friends in the Northern States. It is great fun to go out with the men and boys and teams into the woods, tap the trees and hang up the buckets. Then, when the buckets are full, the sap is collected and taken on sleds to the sugar house to be boiled down into syrup or sugar. Farther south people have tried to get sugar from the silver maple or soft maple, and it will yield a little. This fact is borne out in the Latin, or scientific name of the tree, the real sugar maple, *saccharum*, being so named in Latin, while the Latin name of the soft maple, translated into English, means the maple of little sugar.

TREES FOR REFORESTING

TEN THOUSAND acres of waste private land in New York State can be reforested this year if advantage is taken of the Conservation Commission's offer to distribute, at cost of production, 10,000,000 forest tree seedlings and transplants now in the five State nurseries. The prices range from \$1.50 per thousand for two-year seedlings to \$4.50 per thousand for four-year transplants, according to an announcement just made by the Commission.

One thousand trees will reforest an acre at a total maximum cost of trees and labor of not over \$10, according to the Commission. In forty-four years the value of the stand will be \$370 per acre, if of white pine, and but little less than this if of spruce. This is 292 per cent more than the maximum investment of \$10 would amount to at compound interest for the same period, and 1,016 per cent more than it would come to at simple interest.

A PROTEST

MR. C. C. ANTHONY, of Wayne, Pennsylvania, in writing to the *Philadelphia Ledger*, says: "Haverford College has a namesake in far-off California. Not an infant college, but a giant redwood tree, one of the most spectacular in Yosemite Park, according to a guide-book to the park, which is among the new books in the Library. It shows a photograph of the tree beside a similar sequoia, yclept the 'Ohio,' with the following comment: 'The "Haverford," named for the college in Pennsylvania, illustrates the Indian practice of using big trees as back-logs for fires.'

"This refers, I think, to one of those numerous signs tacked at random upon the big trees in the Mariposa Grove—placed there with as little rhyme or reason as a vandal's initials on a monument, to name the tree after various institutions, people, cities and States—from Peoria even unto New Jersey. If Haverford College has any sense of the fitness of things, it will request the proper authority to have the sign removed forthwith.

"If, in places of great interest, there is anything more asinine than those impudent and offensive signs, the distressed tourist will have to go a long way to find it."

REFORESTATION WORK

THE Semet-Solvay Company, of Syracuse, which owns and operates large mines in West Virginia, under the direction of the Solvay Collieries Company, has recently become very much interested in reforestation on its holdings in West Virginia. It feels that its lands, to be of real value in the future, even though the coal and other minerals have been removed, should be reforested. It is planning, therefore, to begin reforestation either the coming spring or in the spring of 1917. The Solvay Company has asked the New York State College of Forestry at Syracuse to examine and report upon reforestation upon their holdings at Kingston and Marytown, in central West Virginia. Professor J. Fred Baker, of the college, is now in West Virginia examining these holdings, and is accompanied by a party of eight senior students, who will take part in the field examination of the properties. After the field studies are completed, the party of boys will visit several large lumbering operations in West Virginia. Mr. H. J. Kaestner, State Forester of West Virginia, met the party at Kingston to cooperate in any fire protection arrangements which may be suggested.

JANUARY, 1915, COPIES NEEDED

THE American Forestry Association will be glad to buy copies of AMERICAN FORESTRY for January, 1915, and members having copies of that month and not needing them will confer a favor on the Association by mailing them to the office at Washington, D. C.

Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association.

EDITED BY J. J. LEVISON, B. A., M. F.

FUNGUS DISEASES OF TREES

BY R. B. MAXWELL

City Forester, Baltimore, Maryland

THE fungus diseases of trees are produced by the action of plants. These plants differ from those seen about us, in that they contain no chlorophyll, or the green coloring matter which is common with the "green" or higher plants, and they derive their nutriment directly from the trees rather than from the soil. A fungus disease which derives its food from a living plant is a parasite, while one deriving its sustenance from a dead plant is called a saprophyte. Since arboriculture deals only with living trees, arborists are not interested in saprophytes. Parasitic fungi, as a rule, gain entrance to a tree through wounds caused from abrasion, shock, or improper pruning. After having become established, the fungus begins to develop small rootlets, called mycelium, which are pushed out into the tree tissues as a means of anchoring the disease plant and of obtaining food. As a result of the action of certain little-understood stimuli upon the mycelium, a substance is secreted which results in decay or the breaking down of the tree tissues. This, then, is the process which has resulted in unsightly cavities, diseased areas, and frequently discolored or distorted foliage.

In considering this question, let us study it in a broad and general manner, from the viewpoint of those charged with the care of trees. We shall attempt to identify the diseases from the form and character of their fruiting bodies and from the nature of attack, endeavoring to apply curative measures, or to so conduct our cultural operations as to prevent the occurrence of such troubles.

For the sake of convenience, let us divide the tree diseases into three rough groups:

1. Fungus diseases attacking the leaves of trees.
2. Fungus diseases attacking the stem and branches of trees.
 - (a) The rusts.
 - (b) Those with inconspicuous or hidden fruiting bodies.
 - (c) Those with conspicuous fruiting bodies.
3. Fungus diseases attacking the roots of trees.

FUNGUS DISEASES ATTACKING THE LEAVES OF TREES

These diseases are for the most part not dangerous, but are worthy of consideration, since their action is frequently responsible for the marred beauty of our fine specimen trees. The troubles are known as "leaf spots," and belong to the general class of fungi known as molds

and slime molds. The following trees are frequently attacked by the leaf-spot troubles: American chestnut, Norway and red maples, American and European lindens, black walnut, American sycamore, black oaks, catalpa, horse-chestnut, aspens, wild cherry, and magnolia. Of the above leaf spots that of the sycamore tree, the Norway maple, and the horse-chestnut are usually the most serious. The American sycamore is sometimes entirely defoliated by its leaf spot. The leaf trouble of the Norway maple is usually most serious with young trees in



TWO SPECIES OF FOMES

These are found on a large number of deciduous trees and a few evergreens. Members of this group attack beech, maple, yellow birch, sycamore, ash, and black locust.

the nursery. The tender young leaves and shoots are attacked, causing them to turn black and to wither very much, as in the case of severe attacks of plant lice or conditions caused by long, severe droughts. The cherry leaf spot differs from the others, in that it exists as a circular hole in the leaf rather than as an area of discolored tissue. For this reason it is known as the "shot-hole" fungus. The wild cherry is the one most frequently attacked.

Over large areas there is no practical method of controlling leaf spots. With highly valuable park or street trees the trouble may be controlled in one of the following manners:



FUNGUS ON LOCUST TREES

Collect and burn the leaves of all infected trees.

Spray the trees at the beginning of the growing season, when the buds are unfolding, and again in July, using a standard fungicidal spray. Lime-sulphur would be effective and safer to use than Bordeaux mixture, which sometimes burns the foliage.

FUNGUS DISEASES ATTACKING THE STEM AND BRANCHES OF TREES

The class of fungi may be roughly grouped into the three classes which have been given above in this article. Of these, the rusts are perhaps the most interesting. The

peculiar interest of the class lies in the fact that most species do not complete their life cycle on a single host plant, but require two distinct plants. A few of the most important and interesting of the class are:

1. The Cedar Apple, attacking our common red cedar and trees such as the apple, hawthorne, and shad-bush. This disease frequently gives apple growers great concern, as it causes much loss from "scabby" or otherwise imperfect fruit.



A WELL-KNOWN SPECIES

These produce a decay which, in most instances, necessitates tree repair. The directions for overcoming them should be carefully read.

2. The White Pine Blister Rust, attacking the stems of white pine and the common garden currant or other members of the genus ribes.

3. The Fir Rust, attacking the leaves and twigs of the balsam fir and other plants not yet discovered. This disease causes the familiar Witches Broom of the fir.

4. The Spruce Rust, attacking Norway spruce and the leaves of the rhododendron and mountain laurel.

CONTROL OF RUSTS

These diseases may be controlled by the removal of one of the host plants or by the application of fungicidal sprays at the proper season. The first method is a rather heroic one and is therefore usually supplanted by the second. Spraying for rusts will vary slightly with the

latitude, species, etc., but in general an annual spraying with a fungicide at the beginning of the growing season will be effective.

The stem and branch fungi with inconspicuous or hidden fruiting bodies form a small class, but contain several very serious tree diseases. Those of interest to the arborist are:



FUNGUS DISEASE LEADING TO A HOLLOW TRUNK IN A VALUABLE OAK TREE

1. Chestnut blight, which is the most serious of all our tree diseases. It is well understood and does not warrant any elaboration at this time. It is perhaps sufficient to say that its remedy has not been discovered, and that it bids fair to exterminate our only native chestnut.

2. The hardwood canker is a stem disease of hardwoods closely resembling the chestnut blight in appearance and methods of attack. It is particularly common on the horse chestnut. The trouble may be partly controlled by pruning away the infected portions and prevention of wounds, since the disease enters through them.

3. Black knot, a familiar disease, attacks practically all the cherries and is particularly common on wild and red cherry. The fungus causes black knotty growths over the crown, usually the smaller branches, often killing the tree. A careful pruning away of the infected portions early in the spring, and again late in the season, should control the trouble. An application of Bordeaux mixture in the late winter and one in the spring when the buds begin to open should be a further guarantee of success.

The stem and branch fungi with large and conspicuous fruiting bodies (the wood-rotting fungi) form a large class, and they produce the decay which in most instances necessitates tree repair. While the fruiting bodies of this disease are a key to this class it should be remembered that the disease may be present for a number of years without forming fruiting bodies. The diseases are included in four large families, and there are about twenty-five important species. Of this number the most important ones attacking deciduous trees are:

1. *Dadalea*, with three species, common on oaks.
2. *Polyporus*, with six species. The striking "sulphur-like" fungus is perhaps the most interesting and dangerous of the group. It is found on oak, ash, locust, and

butternut. Another important one of the group is a white hooflike fungus which is quite common on gray birch. White rot of red cedar is another dangerous disease.

3. *Fomes*, with nine important species, found on a large number of deciduous trees and a few evergreens. Members of this group attack beech, maple, yellow birch, sycamore, ash, and black locust. Of the evergreens, pine, spruce, and fir are attacked by tinder fungus or rot of conifers.

When one becomes interested in the diseases of this class they have usually developed to such an extent that the only practical solution lies in tree repair. Chisel and gouge must then be used to remove all diseased material, and a water-proof concrete filling put into the cavity. Other suggestions of value would include the following:

1. Destroy all fruiting bodies and infected parts.
2. Avoid the making of wounds, and properly treat all wounds that are made in pruning.
3. Practice clean culture generally, aiming to keep all trees in the most vigorous condition.

DISEASES OF THE ROOTS

From our point of view, only two important diseases are included in this group. They are:

1. Root rot, attacking the roots of a large number of conifers, including red and white spruce, balsam fir, arbor vitae, Scotch pine, and larch.

2. The honey agaric, attacking the roots of a large number of coniferous and broad-leaved trees.

No valuable means of controlling these root diseases has been suggested.

In concluding it is probably safe to say that fungus diseases will give the arborist little concern where the trees are kept in a vigorous condition, and where clean culture is practiced. Tree diseases resulting from the attacks of fungi are usually secondary, following insect damage, starvation, breakage, abrasion, or some similar cause.

QUESTIONS AND ANSWERS

Q. Please advise me in regard to shag bark hickories, whether they can be successfully grafted, and if so whether grafts from trees bearing high grade thin shelled hickory nuts can be obtained and at what season of the year the graft should be set. Also please give instructions for the proper setting of the graft. Also please advise me in regard to the setting of white pines, at what season of the year they should be set out, where they can be obtained and any instructions for setting the trees, etc.

E. P. McK., *Binghamton, N. Y.*

A. I cannot give you much information on the first part of your question, but would suggest your writing the P. J. Berkman's Company, Augusta, Georgia, who specialize in grafting pecans. Dr. W. C. Deming, of Georgetown, Connecticut, who is secretary of the Northern Nut Growers Association, will also be able to put you in touch with some one who can answer your question fully.

To your second question, white pines can be set out

best in the spring. From the 15th of August to the 15th of September is another period when white pines may be planted, but the spring is preferable. In seedling size they may be obtained from any of the nurserymen advertising in the AMERICAN FORESTRY MAGAZINE. As for instructions, we might suggest the following:

As soon as the trees arrive, the bundles should be untied and then immersed in a pail containing water mixed with soil. The bundles should then be "heeled in"—which means placing them in the ground temporarily until they can be set out in their proper places. In "heeling in" the individual bundles should be slanted with their tops toward the South. A cool, shady spot is preferable for "heeling in" purposes. At no time should the plants be exposed to sun and wind and they should always be kept moist. The plants should then be set out in the field at a distance of about six feet apart. If it is larger trees that your question refers to, they may be obtained also from any of the nurserymen mentioned in the advertising pages of this magazine.

Q. I have a large farm near here and am anxious to plant it to nut trees, if they will do well, as I believe I can make more profit out of it in this way, though it is good farming land. Can you advise me as to what trees it would be best to plant, if any, or what your feeling would be in the matter. Also, I would like to know if there is any branch of the Agricultural Department through which I could get some young trees cheaply, or would it be best to purchase them from some nursery here?

E. H. J., *Detroit, Mich.*

A. If you lived in Indiana or Virginia, your planting of nut trees for profit would be experimental, but living on the northern edge of the Northern belt, for most nut trees the location is such that nut growing is entirely experimental, with the chances against any great success. It will be interesting as an experiment, but almost hopeless from a commercial standpoint. I believe in the development of the native nuts of any region more than the introduction of exotic species. There is a human tendency to want to grow coconuts in snow banks, and to overlook, or even despise, the ordinary fruits that grow wild and familiar all about us. I am perfectly frank in advising you in this matter.

Regarding the nursery stock, cedars, pines, beech, maples, etc., there is no branch of the government departments through which these could be secured, and I should advise your securing them from some first-class nursery in Detroit, or one of those which you will find advertising in this magazine. Let me warn you, however, to be particularly careful about the buying of white pine seedlings. You will note in our February issue an illustrated article telling of the blister rust with which white pines are threatened. This is a serious menace.

1. Q. What criticism have you to make of a list of suggested shade trees for street planting in New York State composed of the following: Oriental sycamore, sugar maple, Norway maple, Occidental sycamore, tulip tree, sweet gum, cucumber tree, silver maple, and American linden?

C. S., *Tarrytown, N. Y.*

A. I would revise the list as follows: Oriental sycamore, Norway maple, red oak, European linden and ginkgo for general planting in cities. There are other trees, like the pin oak, red and sugar maple, suitable for the more suburban districts. We have omitted the Occidental sycamore because it does not grow as rapidly and compactly, and it not as free from disease as the Oriental species. The silver maple is too short-lived and too much subject to insects and disease to deserve consideration for general planting. The tulip tree and sweet gum require more moisture and rich soil than the average street can supply. The cucumber tree is not a street tree as far north as New York.

2. Q. I can get rhododendrons cheaply from Holland. Shall I purchase them in preference to nursery-grown stock?

J. B., *Oyster Bay, L. I.*

A. Nursery-grown stock is always preferable to that grown abroad, and planted out immediately upon arrival to this country.

3. Q. Don't you suppose that it would be better to purchase nursery stock rather than transplant wild stock?

K. S., *Albany, N. Y.*

A. Nursery grown trees and shrubs are better fitted for transplanting than those grown in the field or woodland. In the nursery, the plants are root pruned or transplanted at frequent periods—a process which decreases the long top root characteristic of the wild plant and develops large compact fibrous roots which help the plant to take to the new soil more readily.

4. Q. What kind of fertilizer shall I use for the trees set out last spring and when shall I apply it?

M. J. K., *Philadelphia, Pa.*

A. Use well rotted stable manure, preferably two years old. Apply now, though the fall would have been preferable.

ADVICE FOR MARCH

1. Prune fruit trees.
2. Prune fall blooming shrubs, but not the early flowering shrubs, or you will lose their bloom.
3. Before the leaf buds burst, spray for the San José scale with oils on badly infested trees and with lime sulphur on all fruit trees, whether infested with scale or not. Use oil at rate of one part oil, fifteen parts water.
4. Look for San José scale not only on all fruit trees, but also on lilac, Japanese quince, flowering dogwood, mountain ash and elm. Spray with oils. Obtain specific advice by submitting a sample of the insect to the State Agricultural Experiment Station or to the office of AMERICAN FORESTRY.
5. Remove and burn the cedar apples from red cedar. These produce the "scabby" or imperfect fruit on apple trees.
6. Spray silver maples with miscible oils for the cottony maple scale. Do not use oils on sugar maples.
7. Begin preparations for planting. Order your trees and shrubs from the nurseries if you have not already done so. Have your rich soil in readiness, and see that all the tools and accessories for planting are in good order for an early planting season.

The Moral Element of Conservation¹

BY CHARLES W. ELIOT

President Emeritus of Harvard University

ONE of the reasons for correlating national and State conservation in the matter of forests in the United States is that when a forest is taken charge of by the nation or by the state the good work is done for all time. It is a wonderful reward for any human effort that it ties itself to eternity; that the human effort is directed to an end of pure beneficence, and that end is going on and on—that the object is to be pursued generation after generation.

When the United States buys 1,372,000 acres of forest in the White Mountains and the southern Appalachians, it is setting aside for human use and enjoyment a tract which will never come again into private use. It is a perpetual benefaction to the successive generations of men.

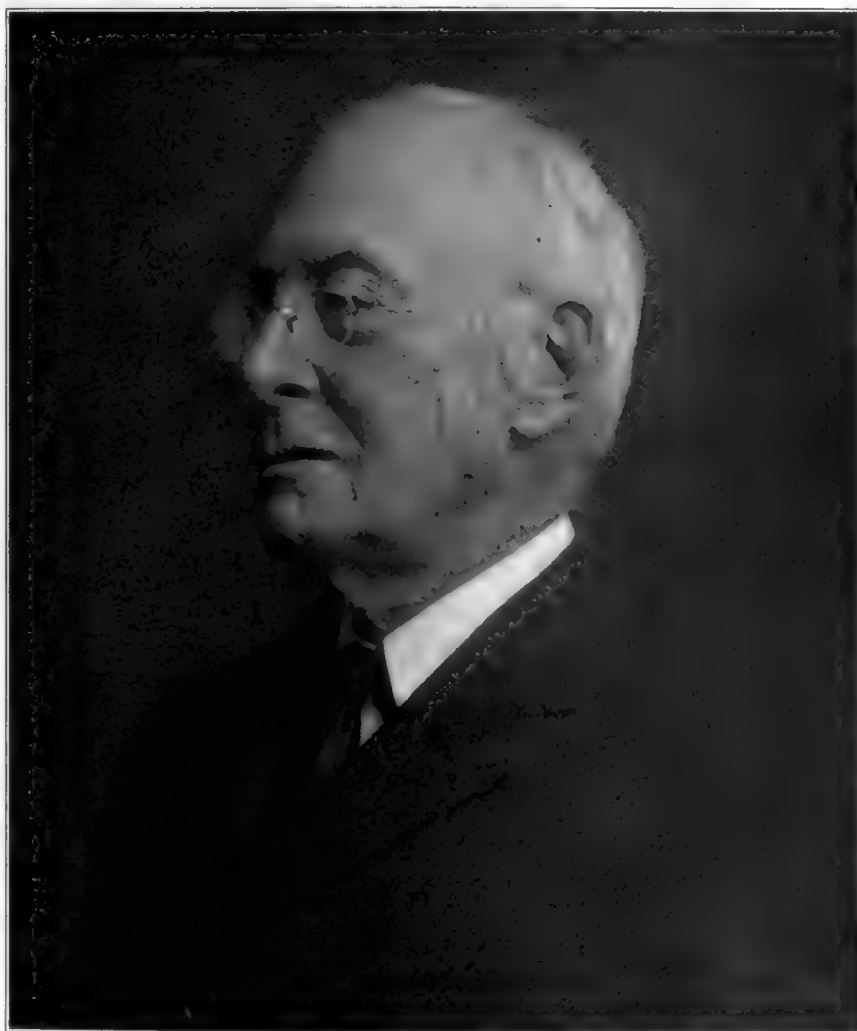
It has been an enormous privilege that I have had to work through a life tolerably long for an enduring and growing institution of education.

Now there is an analagous satisfaction in working for the cause in which you are enlisted, and there is another satisfaction which perhaps those of you who have passed most of your lives in New England do not fully appreciate. It is an enormous satisfaction to feel that by labor done in such a cause as this you promote, for the benefit of future generations, the preservation of natural

beauty, of the immense beauty of the woods, and streams, and brooks, and of the rivers which are fed by the woods.

I have traveled through northern Africa, for instance, and also to the northern shores of the Mediterranean, and

to Constantinople by the Dardanelles, and into some parts of Asia Minor. All through these countries the general character of the landscape is treeless, with the exception of some cultivated groves, and there are few of them. The traveler in southern Japan today sees hill after hill, with no forests; their groves are artificial; their hills are not fertile enough to bear any crops useful to man. It is an extraordinary diminution of the beauty of the landscape, and it is also diminution of the opportunity of enjoyment for the inhabitants. Therefore in Japan the necessary adornment of a shrine or temple has not provided them with anything like the



DR. CHARLES W. ELIOT

President-Emeritus of Harvard University, who was re-elected a vice-president of the American Forestry Association at the meeting in Boston on January 17 and 18, 1916, and who made a notable address at the annual forestry dinner.

forests of New England or of the southern Appalachians.

The saving of the forests is a work of the highest utility also. Large trades and occupations of men depend on the forest, and it is a terrible waste we have been doing for our country to cut off the forests in order to bare the soil.

The chief element in conservation, whether of woods,

¹Address of Dr. Eliot at the joint forestry dinner at the thirty-fifth annual meeting of the American Forestry Association at Boston, Massachusetts, January 17 and 18.

water power or human health, is the moral element in it. And that moral element is conspicuously illustrated today in the comparative strength of the nations who are contending for domination, for rule, for power in Europe.

Conservation is built upon frugality, upon saving—the tendency in the mind and heart of the individual to postpone a present pleasure, a momentary gratification today or at this moment for the welfare of somebody in the future. Now that frugality is the very opposite of our American wastefulness in the treatment of American resources—a wastefulness which has characterized all the pioneer movements across our continent from the beginning. What wonderful and universal frugality has been shown by the French people. It enabled that nation to meet the terrible disasters of the Franco-Prussian war. It disappointed the German conquerors just because of the frugality of the French people. Bismarck thought he had bled France white, and that was a very good metaphor for what he thought he had done. But he had not “bled France white,” as shown by the ease with which the immense indemnity was paid, and by the immediate recovery not only of political France, but also of commercial and manufacturing France. The same thing is being manifested today. The moral quality of the French people is built on two things—their frugality and their sense of public honor.

Now, our history has been just the opposite. Our people are characterized today by wastefulness, by extravagant expenditures for the enjoyment of the moment, without regard to the welfare of succeeding generations. We want to utilize today all possible resources without regard to the well being of the generations that are to succeed to the possession of this soil and this wide continent.

Thus I find the moral significance of these conservation efforts to be deep and broad. Their chief significance for one whose life has been devoted to public education is this moral significance. But then there are many other movements on behalf of conservation with which those promoting the conservation of our forests and the conservation of our water powers must necessarily sympathize, and I find that the various movements for the conservation of the public health of our people are all in line of this movement for the conservation of our forests, for the perpetuation of features of natural beauty, for giving access to the forest parts of our country for the purposes of outdoor enjoyments.

There are those who say that the conservation of the

health of the people and the conservation of the breathing powers of the people are the most important of all conservation movements; and indeed we may well admit the place there is for preventive medicine and for all efforts to promote and maintain public health, and the capacity of the populace for enjoying the open air and natural beauties.

Many men in all parts of our country have devoted much time and labor to this health conservation, and you may add to this happiness conservation for the masses of our people. This movement on behalf of the American forests is part of a widespread and deep-stirring movement for conservation in general of all those resources and all those powers which promote the health and happiness of our people.



SEVENTEEN PALMS SPRING

A famous water hole—not in the Sahara, as one might imagine from the photograph—but in the southern California desert.

SEVENTEEN PALMS SPRING

SEVENTEEN PALMS SPRING is a famous water hole of the Southern California desert, the revivifying water of which has brought renewed life and hope to many desert travelers, while it has been likewise the unreached goal of others whose bones have bleached the old overland trails—those who failed to get through. The spring would be considered but a poor enough watering place to those of us who know only the humid region with its multitude of water supplies and who would consider it an almost unbearable hardship to travel afoot for a single day without water. But to those who have gone several days and nights with no water and under a brazen sun and the mercury at 120° or worse in the shade the Seventeen Palms Spring is life itself. The palms from which the place receives its name seem to eke out a precarious existence and at present there are no longer seventeen of them, some having died; nevertheless, sickly as they appear, they are always a most welcome sight to man and beast traveling this desert route.



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EFFECT OF VIOLENT BOMBARDMENT ON TREES

Much of the recent severe fighting which marked the German attack along the western battle front occurred on the famous Height of Hartmannsweilerkopf, in Alsace. This hill has been captured and recaptured by French and Germans nearly a dozen times, and has been subjected to frequent and heavy artillery fire. The photograph, taken on a hazy morning, with the smoke from heavy guns clouding the sky, indicates graphically the effect of artillery fire on the trees. Before the war this was a thickly wooded forest; now the trees which remain standing have had their limbs shot away and are exposed to insect and disease attacks in the many shot wounds which have shattered them.

Conditions in French Forests

A NEWSPAPER report to the Associated Press from Paris says: "The friends of French forests behind the lines have been reassured by the announcement that Fontainebleau shall not be touched and that the cuttings in other forests for the needs of the army are done by government foresters. The necessary timber for the front will be furnished without causing serious inroads. There is still considerable anxiety as to the fate of forests within cannon range, and behind the German lines. Civilians, evacuated forcibly by the occupying troops and finally sent back to France by way of Switzerland, state that trains bringing supplies to the army instead of returning empty carry back, among other things, immense quantities of the choicest timber of the departments of Meurthe and Moselle, the Ardennes, the Vosges and the Meuse.

"A year's systematic cutting in the estimation of competent authorities would furnish many millions of dollars' worth of timber without necessarily ruining the forests. All depends on how and where the cutting is done.

"Senator Julem Meline, who was born at Remiremont in the Vosges, where 37 per cent of the territory is timbered, and still lives there, says that the war ravages on the forests have been considerable along the battle front, but in proportion to the total wooded country are really insignificant. Some woods, like the Bois de la Gruece have been practically destroyed beyond hope of recovery, but in many other places, excepting among the pines, it is hoped that a great many damaged trees will survive.

"Forest fires are unknown in the region of the fighting, and no damage is anticipated from fire, no matter how intense the cannonading. The timber value of all trees standing along the battle front will have been greatly diminished by the numerous bullets in their trunks because the circular saws that easily went through the lead bullets in the trees after the war of 1870 break their teeth on the hardened projectiles of 1915.

"The timbered regions of France cover 18 per cent of its area and comprise more than 23 million acres. Fourteen per cent of this acreage is in the departments that have been overrun by the warring forces, and of that 14

per cent more than half is still occupied by the Germans.

"The supposition that the destruction of forests was widespread," says Senator Meline, "arises from the profound impression that is produced by certain battlefields where the trees have been razed to the ground. When these regions are compared with the total of three and a half million acres of wooded land in the zone of operations the damage becomes less disquieting."

THE GINSENG DISEASE

THE disease known as mildew, Japanese mildew, or soft rot, which attacks ginseng plants, is found in every one of the fifteen States in which ginseng is grown, according to a bulletin just published by the plant pathologists of the New York State College of Agriculture, who suggest six methods for controlling and preventing the disease. One method, they state, is to spray the plants with a fungicide early in the spring, just as they are pushing out of the soil. They suggest Bordeaux mixture, 3-3-50, to which has been added 2 pounds of arsenate of lead for every 50 gallons of the mixture. The spraying should be continued until all the plants have appeared, and special care should be taken to thoroughly reach all parts of the new growth with the mixture. Other supplemental methods that are offered for controlling the disease include the removal of diseased plants or parts of plants, deep planting, rotation, sterilization of soil, and drainage to remove any accumulation of moisture, since excessive moisture favors vegetable rots.

STUDENTS TO PLANT TREES

THE Extension Department of the State College of Forestry at Syracuse University has been called upon to supervise the Arbor or Forest Day planting of two schools in the State, and will arrange for several others in the near future. The high school at Ellenville plans to set out several thousand pine and spruce trees on a portion of the city watershed, and the children of Pike Seminary, in Wyoming County, will plant a thousand trees on the waste land of a near-by farm. Last year eleven different schools planted from one to five thousand trees each under the supervision of the foresters from Syracuse.

A NEW CORRESPONDENCE COURSE

THE Extension Department of the State College of Washington, at Pullman, Washington, through the Department of Forestry, announces a correspondence-study course in "Lumber and Its Uses." The course has been prepared by one of the best authorities on the subject in this country, and is so designed as to be of special value to lumber dealers, contractors, carpenters and others connected with the wood-working industries. The price of the course is \$5.00, which covers the cost of the textbook and all other reference material. It also includes the correction and return of answers to questions sent in by the students.

7,000,000 SEEDLINGS READY

DURING the month of January the Pennsylvania Department of Forestry completed taking inventories of the seedlings in its twenty-four nurseries. A growing stock of about 13,000,000 seedlings is reported, 7,000,000 of which will be available for spring planting.

An act passed at the last session of the Legislature gives the Forestry Commission permission to distribute free of charge within the State seedlings on hand in excess of the number which can be planted on the State Forests. At its last meeting the Commission voted to set aside 1,500,000 seedlings for free distribution in lots of 500 or more. These seedlings are to be used only for reforestation, and those to whom they are given must pay the cost of crating and shipping.

Requests have been received already for more seedlings than are available, and the department will be unable to meet the demand.

Of the seedlings which can be planted this spring, 4,750,000 are two-year white pine, 500,000 two-year pitch pine, 800,000 two-year Scotch pine, 100,000 one-year sugar maple, 800,000 two-year Norway spruce, and 75,000 one-year honey locust. In addition to these, there are available several thousand of each of several species not commonly used for reforestation in Pennsylvania, such as Japanese larch, Douglas fir, red pine, cucumber, and American elm.

"IF"

BY HARRIS A. REYNOLDS.

If you can toss a match into a clearing,
And never give a thought to put it out,
Or drop your cigarette butt without fearing
That flames may kindle in the leaves about,

If you can knock the ashes from your brier,
Without a glance to see where they may fall,
And later find the forest all afire,
Where you have passed—with no one near to call,

If you can drive your auto through the working,
And cast your stogie stub into the slash,
Unmindful of the danger therein lurking,
Or homes and happiness that you may smash,

If you can leave your camp fire while 'tis glowing,
No thought of industries that it may blight,
Or of the billion saplings in the growing,
Turned into charcoal e'er the coming night,

If you can start a fire beneath a brush-pile,
When the wind is roaring like a distant gun,
You surely should be shot without a trial,
And which is more, you'll be a fool, my son.

GEORGIA STATE FOREST SCHOOL

THE Georgia State Forest School at the University of Georgia, Athens, Ga., in charge of Prof. James B. Berry, occupies a twelve-room stone building, which has been fitted with the class rooms, offices, laboratories, museums and library necessary to the successful presentation of technical forestry. Four large rooms are devoted to museum purposes, each to some particular phase of forestry. The library contains a large assort-

eral electives from any college or school of the university. This arrangement permits of a wide range of specialization, whether it be in the Government service, city forestry, dendropathology, business administration, logging engineering, agricultural engineering, forest management, or research problems in forest by-products.

The freshman year is devoted to a consideration of those basic sciences, botany, inorganic chemistry, English composition, shopwork and drawing, dendrology and trigonometry. During the sophomore year the science courses are continued, while additional work in silviculture and surveying is introduced. In this way the student receives his elementary forestry work in dendrology, silviculture, surveying, and mensuration during the first two years of his course. This arrangement of the work, as well as the reduction of the course to a basis of major and minors, permits of the combining of two courses of study and the securing of two degrees. Thus, the Bachelor of Science in Forestry degrees may be obtained in five years.

Forest Camp is located in Fannin County, in the Blue Ridge Mountains of northern Georgia—and is situated on the Georgia Tract. The camp equipment consists of tents and buildings. Conditions for work in dendrology, mensuration, and surveying are ideal. The camp site is healthful, the country beautiful, the water abundant and pure, the atmosphere invigorating. A ranger school and a nature-study camp are also conducted at Forest Camp. The scope of the ranger school is limited to practical work in surveying and timber estimating for men in the Government service

and for practical lumbermen. The nature-study camp is open to teachers and to persons of mature years generally. A correspondence course in farm forestry is offered to citizens of Georgia who, because of time or expense, cannot attend the university.



EXHIBIT OF THE GEORGIA STATE FOREST SCHOOL

This exhibit was shown at the Georgia State Fair and attracted a great deal of attention and favorable comment.

ment of books on technical forestry and allied sciences, all of the Government and State publications, and a file of some fifty forestry, lumber, trade, and nature-study periodicals.

The curriculum of the Forest School has been completely revised during the past year, and now approaches the ideal outlined in the standardization of courses. The number of credit hours has been cut to eighteen a year, which is considered as much work as the average student can carry and master. A fourth term has been added, however, to each of the first two years. The summer term is given in Forest Camp, Fannin County, and is devoted principally to field practice, thus securing the proper correlation of work. At the beginning of the junior the student is required to designate his specialization, and must select the courses he desires to pursue during the remaining two years. A major and a minor must be selected in forestry, a major from one of the departments of farm mechanics, agricultural botany, horticulture or botany, and twelve credit hours of gen-

IOWA WANTS NATIONAL PARK

FEDERAL aid will be asked by the Iowa Forestry and Conservation Society, which met at Ames, Iowa, recently, for the creation of a national park in northeastern Iowa, along the Mississippi River, the Switzerland of the Middle West, says a newspaper dispatch. Senator Kenyon already has started the movement in Washington, and Iowa, Wisconsin, and Minnesota Senators and Congressmen are expected to help. Governor Clarke, of Iowa; State Forester Cox, of Minnesota, and other prominent men have indorsed the movement.

JOSEPH AUSTIN HOLMES—AN APPRECIATION

BY W. W. ASHE

DOCTOR HOLMES, or Professor Holmes, as he had been known for many years to those intimate with him, was not a forester, but the annals of the forestry movement in the United States are incomplete without mention of his influence as advocate and propagandist. He was for many years a prominent member of the American Forestry Association, representing the State of North Carolina as one of its vice-



JOSEPH AUSTIN HOLMES

Chief of the Bureau of Mines, Department of the Interior, who died recently, was an ardent forest conservationist, and did much to further the movement for the Appalachian National Forests.

presidents. As State Geologist of North Carolina, he incorporated forestry in his program upon the reorganization of the North Carolina Geological Survey in 1891. With an allotment for this branch of work which seldom equalled \$1,500 a year, both for salaries and expenses, he maintained this department, although with many breaks, for more than ten years, or until he practically severed his official relations with the State.

Under his direction the forestry work was developed along the lines of conservation, although at the date of its inception the greater portion of the forest resources of western North Carolina were considered inaccessible and unavailable for exploitation. Nevertheless, while urging their exploitation, as was required by law, there was

uppermost in his mind the conservation of this enormous resource, on which not only the valuable water power of the State was dependent, but from which ultimately the raw material could be drawn for developing and permanently maintaining an extensive wood-working industry. Under his direction, studies were made to determine the value and quality of turpentine collected by the then customary method of boxing and by the use of the cup and gutter, the object of which looked not so much at that time toward saving the small bodies of untapped old pitch pine timber which yet remained in North Carolina

as toward showing the possibilities of young timber and as an incentive to its protection. In this connection the reforestation of denuded long-leaf pine lands, both by natural restocking and by planting, was considered. A study was made of the growth and methods of management of the short-leaf pine of the coast (*Pinus taeda*), the results of which have only recently been published. With Mr. Holmes' sanction, studies were made also of the forest flora of the southeastern United States, especial attention being paid to that of the southern Appalachians. Testimonials of his interest in these studies are a well-known hawthorn which bears his name, *Crataegus holmesiana*, and a hickory, *Hicoria (Carya) holmesia*.

The most important forestal project with which his efforts will be associated is the establishment of the Appalachian National Forests. For several years a large portion of his funds available for forestry work was utilized in cooperating with the Federal bureaus in making the preliminary examinations in furtherance of this measure. The many features of value of the Appalachian Forest appealed to him—their promise, their influence in regulating stream flow by protecting the headwaters of important rivers flowing in so many directions, their elemental beauty and recreational significance, their interesting botanical and silvical characteristics. He understood the complexity of the problem of their management and realized the necessity for their rescue by the Federal Government if they were to be saved for the use of the people. If not the original proponent of this far-reaching and vital policy, he was certainly one of its earliest advocates, and forthwith became the protagonist of the movement. His agitation of this plan began more than fifteen years before the passage of the Act of March 1, 1911, which authorized the purchase of mountain lands for eastern National Forests, and his interest in the project continued unabated until it was realized.

The stimulus which Doctor Holmes, by his enthusiasm, imparted to forestry in the South and East will be felt for a long time to come, and well supplements his broad usefulness as director of the Bureau of Mines. While the promotion of forestry was only one of the many directions in which his energy was expended, the impetus which he added to the movement must always be considered as one of his achievements.

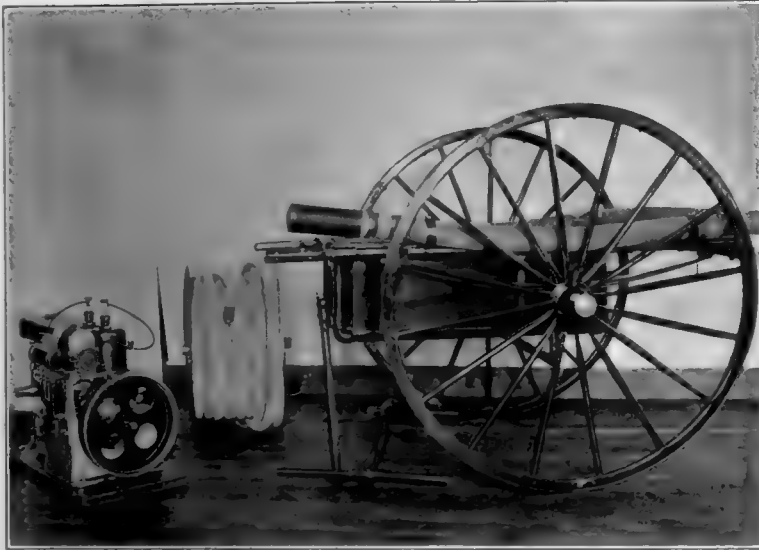
Mechanical Fire-Fighting Equipment

By G. GERALD BLYTH, *Dominion Parks Branch, Ottawa, Canada*

FIRE protection in the Dominion Parks situated in the Rocky Mountains of Western Canada presents many interesting problems, one of the most difficult being the delivery of water to a fire. The old-fashioned

made of several different engines, a suitable one was finally decided upon; one of from four to five horsepower, two cylinder, equipped with a Bosch magneto. This engine was mounted on an aluminum base and direct connected to a rotary pump made of bronze. The engine has a speed of approximately 1,200 r.p.m. The pump has a suction port 2 inches, and a delivery of 1½ inches in diameter. The maximum water pressure is about 100 to 125 pounds at the pump, which is capable of delivering water through 1,000 feet of 1-inch rubber hose, or 1,500 feet of 1½-inch unlined linen hose. The engine and pump weighs but 118 pounds.

Suitable means of carrying this outfit over wagon roads in the parks, as well as over trails, and even through the bush, had to be considered. A truck was therefore constructed similar to the illustration, on which the engine and pump were mounted. A special auxiliary truck was also constructed for carrying the balance of the hose assigned to the unit. The engine truck, besides carrying the engine and pump, also carries 200 feet of 1-inch rubber-lined hose, tools, gasoline, oil, carrying handles and straps. The

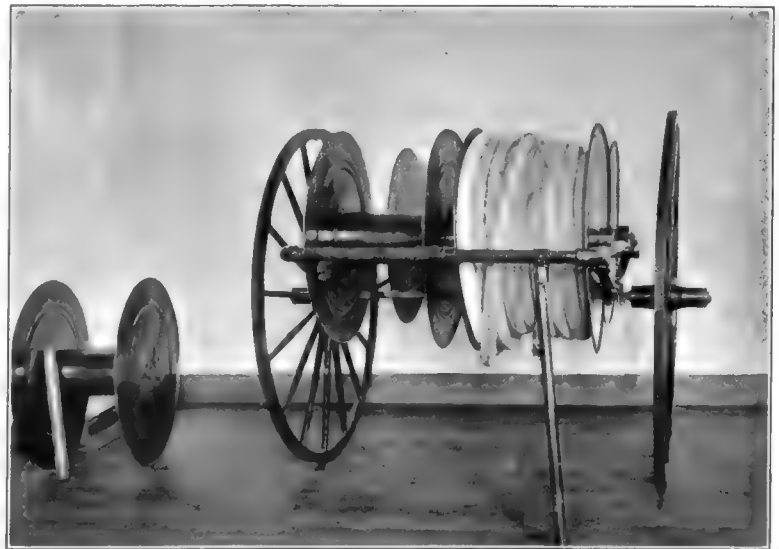


AN AID IN FIGHTING FOREST FIRES

On the left a two-cylinder, four to five horsepower gasoline engine and pump. This can be mounted on the truck. It develops about 125 pounds of pressure through one thousand feet of hose. The outfit can be hauled by horse or man power and is most efficient in forest fire fighting.

fire-fighting equipment, namely, the ax, shovel, mattock and canvas water bucket, whereas absolutely indispensable, must soon pass into the background to be superseded by more effective equipment of a mechanical nature. It has been found by experience that it is exceedingly difficult to completely extinguish a fire without the application of water. Carrying water to a fire by manual labor in pails or buckets is, as a rule, a laborious task, and, indeed; in some cases almost out of the question, especially up a steep mountain slope. The need of a more efficient method of carrying water to a fire and distributing it sparingly thereon has been apparent for a considerable time, and to meet this want the Department of the Interior of Canada, Dominion Parks Branch, has recently designed and constructed a portable gasoline pumping unit, equipped with 1,000 feet of one-inch rubber-lined hose, which, it is confidently expected, will fully measure up to the expectations of those associated with its construction.

The gasoline engine market was carefully searched for a light and thoroughly portable gasoline engine of the two-cycle type. After a careful investigation had been



THE HOSE TRUCK

This is an auxiliary to the engine truck and has four metal reels mounted on spindles each having a capacity of 200 feet of one-inch hose. Each reel is detachable and quite portable.

truck can either be hauled by horse or man power, and the wheels have a gauge of 3 feet 3 inches. When the country becomes too rough to permit of carrying this equipment on the truck, the engine and pump are

carried by two men on a wooden stretcher, aided by shoulder straps. The hose truck has four metal reels mounted on spindles, each having a capacity of 200 feet of 1-inch rubber-lined hose. Each reel is detachable and is quite portable. The reels on the hose truck are interchangeable and are exactly similar to the one reel mounted on the rear of the engine truck. The unit with its auxiliary truck carries 1,000 feet of hose in all. The auxiliary truck is capable of being hauled by man or horse power, as conditions will allow. Fifteen hundred feet of 1½-inch unlined linen hose were also purchased and sent out with No. 1 outfit, and tests will be made in the field to ascertain which type of hose is most serviceable and efficient. The linen hose is considerably lighter in weight, less bulky, and consequently much more portable. If the linen hose is found to be more satisfactory a specially constructed hose truck will require to be built or the present one modified.

In tests held in Ottawa before the unit was shipped West to the Dominion Parks, the outfit pumped a powerful stream through 450 feet of hose, lifting the water up 170 feet. The idea is to have several such units available at the headquarters of the park in which this unit is now stationed. If a fire occurs a considerable distance from a railway, road or trail a sufficient number of gasoline pumping units, each equipped with 1,500 feet of hose, can work in relay fashion, pumping from the source of water supply into a canvas tank to a second outfit, which would have its source of water supply from the canvas tank; in this manner water can quite easily be delivered to a fire a mile or so from the nearest available supply.

A Ford chassis was also purchased and a suitable carrying box constructed. This car will be kept solely for fire-protection purposes and is so arranged that the portable gasoline pumping outfit and hose, etc., may be mounted thereon.

This unit was built as an experiment, and much interest will center around it during the coming field season, while it is undergoing a thorough practical test in the Rocky Mountains Park. If the outfit proves successful, it is hoped that further ones will be constructed and a standard design adopted. If successful, this is not all, as one of the most difficult problems in fire protection, namely, getting water to the fire, will have been solved.

FOOD TREES

By ALICE M. LONG

"MOTHER, some bread and butter with marmalade would taste pretty good."

"Well, go out to the trees and pull them, son."

And that is just what one might do if he were living in a tropical country where three certain kinds of trees were growing in the yard.

The farmer might find it more profitable to cultivate these trees than to grow wheat; father wouldn't find it necessary to work so hard for daily bread for himself and loved ones; mother wouldn't have to remind herself

to make up the sponge for the family baking; neither would she be obliged to toil over a hot stove on a hot day to make marmalade to satisfy Robert and Annabel's sweet tooth.

The bread fruit tree, although a native of South Asia, the Indian Archipelago and the South Pacific Islands, is also grown in some of the West Indies.

The fruit of this tree is round. It weighs about four pounds and is covered with a rough rind. When ripe it is juicy and yellow, though it has a better flavor before it is fully ripe.

Bread fruit is very nourishing and is the principal food of the South Sea Islanders. After it is cut up and baked it is white and mealy, strongly resembling our own wheat bread.

One would scarcely expect to find butter growing on trees, but this is what you would see if you were to look for the Shea (she'a), or butter tree, which is a native of Africa.

The nut of this tree is enclosed in a soft pulp which is covered with a smooth skin. The pulp is sweet and nutritious and a large percentage of the nut is butter.

In addition to the "bread spread," if a man wants a light at night he can depend upon his shea tree for candles, while from it there may also be produced sufficient soap to insure the practical expression of "cleanliness is next to godliness."

Marmalade—Mm! Think of picking all the bread you want from one tree, getting a generous supply of butter from another and then from still another tree a delicious spread of marmalade over these, just as thick as you want it.

The tree which furnishes this sweet is a native of the West Indies.

But this isn't all. Suppose you want at the last of a wholesome meal something that leaves an exceptionally good taste in the mouth. Why, then, just step over to the little custard tree or shrub for your desert. You will find hanging upon it fruit balls about the size of a small orange, enclosed in which is a soft yellowish sweet pulp.

A near relative of the custard tree is the Sour sop, though its somewhat acid fruit might better serve as a first course at breakfast.

But after all, are these rather remarkable trees more wonderful than the many with which we are familiar? Is there anything more strengthening than the nuts growing wild in our forests and under cultivation upon plantations in many parts of our country? Are they not wholesome and palatable substitutes for flesh? Then, all credit to the "meat" trees.

Can we find anything more delicious than our native apples, pears, peaches, cherries and other ready-to-eat fruits, too numerous to mention?

Would it not broaden our ideas, awaken our higher selves, and bring us into sweet harmony with all things that live, grow and have being, by giving more thought to what nature does for and is to us?

Uses of Lumber

BY WARREN B. BULLOCK

IN all the talk of "war babies" of the months since the European war broke out in all its fury it has been supposed that the steel and metal industries were those which were chiefly feeling the increased prosperity, due to a demand for the products of steel mills for shells and other equipment, and of the copper smelters for various war uses of that metal. It is generally supposed, even today, that the prosperity in war supplies is directly applicable chiefly to the metal plants, but the trouble abroad has produced some unique uses for various woods, as well as steel.

It was for the Wisconsin manufacturers of birch to discover that they could find a fine market for their wood in the gun factories. In the days before the war, when rifles were not being made in such enormous quantities as at present, the demand was chiefly for black walnut. The supply of this wood, however, had decreased until it was rare in some parts of the country, and the demand for a substitute was strong even before the war. The summer before Europe's conflagration burst out, the writer was in Kansas, and found that there was a handsome demand there for black walnut stumps. In eastern Kansas, be it known, the black walnut was in days gone by in great demand for rail fences. Large quantities of this wood, now of great value, were used for this roughest of purposes. But with the shortage of supply came the discovery of Kansas farmers that their old stumps were fine material for gunstocks. On this Kansas trip the writer saw carloads of stumps waiting for transportation to the East for conversion into stocks. Prices paid were high, it might be added, as these butts, dug from the ground and trimmed, were just the size needed for the gunmakers. Whole train loads went East, so the supply, even of stumps, was nearly gone before the great demand for wood caused by the war.

When firearms manufacturers began looking for some wood to take the place of the reliable old walnut, the attention of Northern timber owners was called to their birch, especially the cherry, or shell-bark birch, as it is known in the country where it grows. Tests by various standards were made of birch for gunstocks, and it proved entirely suitable. So the Wisconsin association of manufacturers who handle birch and other hardwoods sent telegrams to firearms manufacturers all through the East, suggesting that birch be considered.

The result of this campaign was instantly apparent. Prices have jumped to as high as \$60 per thousand feet, delivered in the East, for birch of the proper thickness for this use, and sales are still being made of Northern birch for this purpose.

IF Kansas has lost its trade in black walnut for guns through the destruction of the source of supply, there has been found a new use for one of the other woods of Kansas, Oklahoma, Missouri, northern Texas, and other Middle Western States in the Osage orange. This wood, hardly more than dwarf tree and never grown artificially except for hedges and wind-breaks, has been found to be of practical use in meeting the shortage of dyestuffs due to the same war conditions which made a new market for birch. Experiments by forestry experts and chemists disclosed that the Osage orange contains color which can be converted into a long series of dyes of the yellow shades, ranging from brown to tan, and which seem to be effective in wool or silk fabrics. The tests have not as yet been worked out extensively chemically, but several dyestuffs concerns are preparing to develop this new field with the cessation of shipments of dyes from abroad and the consequent famine in the color market in America.

* * * *

THE series of experiments in wood preservation which have been carried on for several years by various experts have developed the fact that there is a woeful lack of facilities for the average user of lumber to properly treat the wood he wants to use in places where it will be especially susceptible to decay. Creosote, which has been found to be the most valuable preservative, has been sold only in large quantities, making its use difficult for the farmer or small miscellaneous user of wood, who is in greatest need of the preservative. In response to this demand, some creosote companies have at last arranged to put out creosote in small quantities. This sale of creosote oil is now to be commenced through local retailers, as the manufacturers have arranged to put out their oil in five-gallon cans or barrel lots at reasonable prices, and in such form that the oil can be used on the farm or on the spot by building contractors.

* * * *

TO revert to the talk of "war babies," there is a belief among hemlock manufacturers of the North that large contracts for yellow pine by European governments are partially responsible for the recent increase in demand for hemlock. The use of yellow pine for trench work, both as timber for the building of dugouts, the sustaining of dirt roofs and the boards for other trench purposes is said to be extensive, and especially so during the last few months, when the prospect of a winter in the trenches or underground forced radical steps for the comfort of the soldiers. The first year of the war largely exhausted the home supplies of timber for such purposes, and heavy shipments of the

yellow pine abroad reduced the supply in the Northern markets, where it had previously held sway as a strong rival of the Northern white and Norway pine, hemlock and other timber.

* * * *

UNEXPECTED assistance came in February to the campaign of American lumbermen for the right to cooperate in preserving standing timber, from no less a source than President Charles R. Van Hise, of the University of Wisconsin.

His report to the lumber industry in one of its most vital points came in his address before the Wisconsin Commercial Congress, when he declared that an amendment to the Sherman anti-trust act was vital to the business future of America. The lumbermen of the country in recent hearing before the Federal Trade Commission declared that they believed that the conservation of American forests could best be obtained by governmental recognition of the fact that the lumberman should be

allowed to cooperate in curtailing lumber production to an extent which would bring a reasonable profit on stumpage. At present, owing to the competition and lack of such cooperation, it was claimed that lumber is being cut in the most wasteful fashion at an actual loss, the cream taken and the less valuable left. The lumbermen believe that cooperation under Federal regulation should be permitted to force proper conservation methods in cutting timber, and thus protect the forests for the future.

With this view President Van Hise agreed, though not specifically mentioning the lumber industry, when he declared that the first section of the Sherman law should be so amended as to mean "restraint of trade that is detrimental to the public welfare." He said this was the only solution of the problems relating to big business. The retention of competition, permission for cooperation and regulation of such cooperation were recommended in his address. Cooperation, but not to such an extent that it becomes restraint of trade, he declared to be the greatest need of business today.

Town Forests and the Lincoln Highway

BY HARRIS A. REYNOLDS

IN the ornamentation of the great national monument, the Lincoln Highway, trees, shrubs and vines must play an important part. The planting of forests or the reservation of some of those now in existence along this highway is also necessary.

The early years of Lincoln were spent in the woods. Much of his life was associated with frontier conditions. Therefore, in the decoration of this highway to commemorate his life, what would be more fitting than the establishment of permanent forests? Town forests, managed on scientific principles, would serve in many ways the communities in which they were located, and such management would guarantee their permanence.

In Europe are town forests over 1,000 years old, and they are more valuable and probably more beautiful today than ever before. They certainly are more appreciated now than at any time in the past. Those forests are not only self-supporting, but they return a handsome income to the municipalities. As wild parks, they have few equals, and their recreational value cannot be estimated in dollars and cents. Many of them are bird and game sanctuaries as well.

The idea of cities, towns and villages owning and controlling forests is comparatively new to this country, but its rapid realization is most remarkable. In the past five years no less than nine States have passed laws enabling their cities and towns, and in one case the counties, to acquire and control forests. The movement is recognized as one of the great forces, if not the greatest force, for conservation that has been brought forth. It will bring the value and necessity of conservation nearer to the individual, who must eventually begin to conserve

the natural resources of this country. The number of places that have actually established such forests is small as yet, but many communities now have the matter under consideration.

Several of the States which have laws permitting such ownership of forests are traversed by the Lincoln Highway. Other States are certain to pass similar laws in the near future. Why, then, should not the cities and towns that are favored by their location on this great road begin at once, where it is possible, to acquire lands adjacent to or in the immediate vicinity of this highway, with the object in view of creating forests on them? The advantages that town forests bring to communities are obvious enough. One need but glance at the hundreds of splendid examples in the various countries of Europe to be convinced of the value of the proposition from the economic standpoint. The experiment has stood the test of time.

Difficulties will be encountered in the establishment of town forests as a matter of course. But with State legislation permitting such action by the municipalities those obstacles will be purely local. The advice of the State Forester as to the selection of the proper site can be obtained usually without cost. It remains for a public-spirited organization, such as a board of trade, improvement society or woman's club, in each locality, to head the movement; and public sentiment can readily be aroused in favor of any worthy undertaking of this nature. The women's clubs are already committed to the work of beautifying this highway. Plans are being made. It would seem that the creation of a town forest

near the highway in each community could well become a part of the general plan of beautification.

We shall not discuss here the actual benefits that would accrue to the town from such a forest, but how would it affect the highway itself and the millions of travelers who will pass over it in years to come? The more beautiful the highway, the more popular it will be. Imagine yourself one of those travelers passing through certain forestless, if not almost treeless, regions of some of the Middle States, or a cut-over, burned-over section of Pennsylvania! What a relief it would be to pass at intervals through stretches of beautiful forests! They would surely lend variety to the landscape and comfort to the traveler. Especially would this be true if he could stop for refreshments in the cooling shade of the forest, just as the visitors to the European town forests can do, and enjoy the music furnished by the feathered orchestra of the woods.

It has already been suggested that provision should be made to establish an abundance of bird life along the route. This cannot be done on an effective scale unless wooded areas are provided. Shade trees and shrubs alone would not attract the birds. On the other hand, forests, under proper management, will contain enough undergrowth to encourage nesting, and an area set apart in each town as a forest could readily be made a bird sanctuary. State legislatures should carry this work further by permitting and assisting owners to establish bird and game sanctuaries on all woodland property in the vicinity of this highway. The birds soon learn where the safety zones are, and such sanctuaries distributed along this route would soon result in a population of songsters.

Nothing is more pleasing to the average person than the beauties of the forest, with all the comforts and enjoyments that naturally accompany it. If some thought is given to the landscape treatment of the forest, the result can be made all the more pleasing. In the development of town forests, such as we are advocating, the areas immediately adjacent to the highway should be given special attention. By the careful selection and artistic arrangement of the species, the creation of attractive vistas, and the application of the principles of silviculture the most picturesque effects can be obtained. The towns will naturally do all in their power to make the highway beautiful, and it is to be hoped that the creation of town forests will be incorporated in the scheme of decoration for this great National Monument.

LUMBER COMPANY'S GOOD ADVICE

MR. W. L. GROOM, president and general manager of the Tar River Lumber Company, of Rocky Mount, North Carolina, on being asked by **AMERICAN FORESTRY** to write his advice, based on his company's successful experience in preventing forest fires, said:

"It is certainly high time that every American should know or be taught the danger and loss by forest fires.

Nothing should be left undone to educate our people to this real, important fact.

"I will briefly touch on how to prevent, not about what has happened, but how to avoid a reoccurrence, of forest fires:

"First. Lumbermen operating logging locomotives, using coal or wood, can do so much to prevent fire by raking back, say, 80 feet from their track when it passes (as is usually the case) through the forest and burn all leaves, straw and other material that will take fire. Then by all means equip their locomotives with the very best device they can buy to keep the locomotives from throwing sparks (and, by the way, the best thing I have tried is the South Bend spark arrester, made by the South Bend Spark Arrester Company, South Bend, Indiana); also to use all possible means to prevent employes from carelessly putting out fire.

"Second. Farmers should make it a point to see that their tenants or employes do not start fires they cannot control. While to clean up land a fire is as much needed as a plow, *it must be controlled*. Fire is a very important thing, but good judgment must be applied in its use. Many a splendid neighbor has been made much poorer by some careless fellow letting a fire get away. Seldom do we hear of one farmer paying his good neighbor's damage when he or his hands have let fire get away and damaged him.

"Third. Hunters should more fully understand how to protect our forests and what a destructive forest fire means. Thousands of dollars' damage has been done by fires that have started from a match, a lighted cigarette or cigar that has been carelessly thrown away in the woods.

"Lumbermen operating locomotives and stockholders holding stocks in railroads have, to my mind, paid out many a dollar for fire claims when fire was put out by others than their employes. These people have had a hard time in the past. Let's all do our best to cut out this big fire loss, and let's see who can report the least forest fires in their section during the year 1916."

WOODMAN, CUT THAT TREE

THE following verse, written on the inspiration of the moment, upon hearing a recitation of the well-known poem, "Woodman, Spare that Tree," is teeming with sound advice, and in six lines delivers a sermon on forestry which should be far-reaching:

Woodman, cut that tree;

It's dead and takes up space.

Put the money into more.

Plant another in its place.

Plant your old pastures to white pine—

That's what I'd do if they were mine.

J. HARRY RICH.

Editorial

STATE FORESTRY ORGANIZATIONS AND PROBLEMS

A FORESTRY policy for a State is founded on the protection of forests from destruction. Before the development of State forestry, the acreage burned annually and the damage done was appalling, and was reducing a great proportion of our woodlands to desert conditions. It has been the task of State forestry departments to cope with this situation, and by education, organization and law enforcement gradually to obtain a strangle hold on forest fires. Then comes the great work of suppressing insect depredations and injurious diseases, one of which, the white pine blister rust, is just assuming dangerous proportions. To render the forest *safe* is the first step.

Next in importance comes the task of educating land-owners to take care of their forest lands, and to use them for the production of timber crops. There are many ways of attacking this problem. Circulars and bulletins with useful information reach many; lectures, if given by persons who have real information to convey, bring the question home to others; but there are still more practical means of spreading the gospel of forestry. The growing and distribution of tree seedlings at cost for forest planting is a help. Even more effectual are object lessons in planting upon State lands purchased for the purpose, such as is carried out in New Hampshire and Massachusetts.

The final problem in State forestry is that of State ownership and management of a certain amount of waste land in tracts large enough to show the commercial and practical possibilities of forestry. This policy Massachusetts, Vermont and Connecticut have adopted, and in other States it has been developed to include ownership and management of over three million acres, exclusive of the purchases of the National Government in the East, now totalling over a million acres.

To carry on and develop a successful and well-rounded State policy, the entire work must be in the hands of men who understand what it is all about, and who can proceed with the certainty which comes from training and education toward the attainment of definite, clear-cut objects. Not only that, but the work must pay. The returns must be adequate for the expenditures in whatever line the appropriations are directed. Efficiency is the watchword of the hour, and the blundering, waste and excessive cost of inefficiency, due to lack of adequate training, is just as criminally inexcusable in our internal affairs as it would be in waging war.

The result of inefficiency and waste, if too long continued, will inevitably be either the abandonment of the enterprise, if it is considered unessential, or the enforced reorganization of the management, so that results vital to the Commonwealth may be secured.

In the present stage of development of forestry its magnificent opportunities and the vital bearing of its economic relations to our future social health are only dimly perceived by legislators, and, facing a crisis arising from mismanagement, it may frequently happen that retrogression is recommended rather than reform.

In spite of object lessons on every hand, we have not yet fully grasped the fact that efficiency in State forestry can be obtained only by giving the work into the hands of efficient foresters and keeping it there. Whatever may be said of the possibilities of partisan political government along other lines, politics and forestry will not mix. A political forester, without technical knowledge of his subject, is as hopelessly out of his element as a fish on dry land. His principal concern is to make believe to accomplish something—he is never quite sure what—and to continue to bluff as long as there is a salary to draw or other perquisites in sight. When he has exhausted the patience of the public, it is time to regain popular favor by recommending the abolition of the work as a measure of economy and efficiency.

Take a concrete case. In 1893 New Hampshire created a forestry board composed of political appointees who had the bestowal of a secretaryship at a salary of \$1,000 per year. This sum promptly became the perquisite of a prominent politician residing in Concord, who continued to draw it for sixteen years without rendering any practical return. Finally, rendered uncomfortable by the rising tide of interest and criticism, he sapiently suggested that the entire board, with its paid secretary, be abolished and the duties of the office turned over to a clerk in the Department of Agriculture. Thanks to the services of former Governor Robert Bass and others, this suggestion was vetoed, the board was renovated, and for the first time a technically educated man employed as forester. That was in 1909. In the six years following, and in spite of a desperate and unsuccessful attempt to reorganize the forester's office so as to restore its original status as a political plum, the board has retained the State forester, and the policy of the State has been crystallized into definite achievement. Among the results obtained are State-wide fire protection, the control of railroad fires, a State forest nursery, State forest reserves, and the preservation of the Crawford Notch at a cost of \$110,000.

We do not obtain efficiency in great State enterprises like the construction of highways or canals by permitting the work to become the plaything of party politics. The trained engineer must be in charge, or waste is inevitable. It is equally absurd to hope to raise the edifice of a State forest policy on the foundation of practical politics. No civilized nation but ourselves

would even consider such a possibility. Forestry in every Continental country is controlled by men specially fitted by long training, based on technical preparation, and promotion is by efficiency alone. It is true that in our hit-or-miss wasteful system we are apt to regard men as capable of turning readily from one occupation to another, and of jumping in and out of forestry to suit the vicissitudes of political changes or the whims of nontechnical bosses, but no enduring work in State forestry will ever arise until the profession rests on a basis so sound that men of more than average ability can undertake State work as a life job, secure in their positions as long as they deliver the goods. A State which is unwilling to segregate its forestry work from politics and provide for a permanent constructive policy is wasting time and money meddling with the subject.

How is this segregation to be obtained? Experience covering two decades has shown the best method of accomplishment. The program has both positive and negative injunctions.

First. Create a forestry board, composed of men selected for their interest in or knowledge of forestry.

Second. Do *not* have the Governor as a member of this board. He is too closely affiliated with partisan politics. He may appoint the board, but should be aided by advice of an authoritative character on the part of State forestry associations or other bodies.

Third. Make this board responsible for selecting and appointing the State forester, and provide that he shall be technically trained.

Fourth. Do *not* place this appointive power in the hands of the Governor. In three different States in which this latter arrangement is in force successive Governors, although charged by law to select only a technically trained man for this office, have overridden the law and appointed men not only without such training, but in some instances with no knowledge, capacity or desire to perform the duties of the office.

Fifth. Do not appoint the State forester as a member of this board, but let him act as their executive agent and secretary. Where a State forester is appointed by the Governor and is a member of a board, the board is too often reduced to a position of impotency, and can exercise no effective check upon the executive. No really efficient forester fears the control of such a board, but rather welcomes it. Many important problems arise, and often matters of policy, which call for strong action. An able and conscientious board can either take the responsibility for a policy which would otherwise embarrass the forester or can restrain his desires should they prove too radical.

With a healthy and organized public sentiment to make sure that proper appointments are made to such a forestry board, the maximum of efficiency is possible. This plan is not a theory evolved in the brain of some professor of forestry; it is the concrete result of practical demonstration in the laboratory of American poli-

tics. The States which have attempted something in forestry and failed are those which have made one or more of the mistakes in organization indicated above. The States which have limped where they should run are those which have been handicapped by some form of political influence which thwarted the free play of the ability of technical foresters. The States where forestry has in the past decades made substantial strides in public favor and in actual achievement are without a single exception indebted to the work of technical foresters for most of this progress, either in a major or subordinate capacity or by example.

These principles need all the greater emphasis because of a flank attack which lately has been gathering momentum under the banner of efficiency and economy. It has become the fashion to effect consolidations, reduce the number of commissions and State departments, and thus secure substantial saving in executive machinery. This conception, admirable in itself, when it is brought to bear on forestry, tends to seek out other State departments of a more or less kindred nature and to consolidate them under one head. Subject to such amalgamation are park, water supply and fish and game commissions, State geological survey and State conservation commissions. The term conservation in effect serves as a catch-all in which to dump various State activities, whether or not they belong together.

Again, we base our opinion of this process not on the theory of efficiency which dictates it, but upon its practical results. If for efficiency we require the subordination of the forest policy and interests to those of commissioners far more interested in the preservation of wild life, or the regulation of State water powers, we will secure perhaps a saving, but not a forest policy. The State of Louisiana has waited patiently for several years for the appointment of a forester by the State Conservation Commission, and at date of writing the commission is still promising to take this action in the near future.

Such consolidations defeat their own ends. The principle is wrong from top to bottom. State forestry must not be consolidated with a miscellaneous assortment of conservation interests, but must stand or fall as a clean-cut and separate proposition, judged on its own merits, financed with its own funds, and managed by its own board and executive. Then, and then only, will we be on the road to successful demonstration that we can do in this country with our wild lands what every other civilized nation has been doing for the last century—produce continuous and paying crops of commercial timber.

AMERICAN FORESTRY FREE

Have you friends who love trees, woodlands, forests? Send their names and addresses to the American Forestry Association.

A free copy of American Forestry will be sent them with your compliments. Do it now before you forget.

WHAT THEY SAY ABOUT "AMERICAN FORESTRY"

"I wish to say the AMERICAN FORESTRY has improved in every department during the last year and your plan of taking up each species separately in both hard and soft woods is the right idea."

R. J. COLVIN,
*President, Colvin-Fleming Lumber Co.,
12 Norway Park, Buffalo, N. Y.*

"Permit me to commend the monthly publication of the Association. It appears to me to be in every respect admirable. I regard it as an especial privilege to be associated even to a limited extent with the enterprising young men who are responsible for this publication. I wish to congratulate you especially for the energetic and effective part you have taken in this enterprise."

R. S. WOODWARD,
*President, Carnegie Institution of
Washington, Washington, D. C.*

"I like the new magazine so well that it is a pleasure to recommend it to my friends, which I am doing strongly,—with what success I cannot say. Will be glad if my efforts gain one member. A member gotten now will always stick, for the incentive is surely great."

W. W. GOODYEAR,
Carlisle, Pennsylvania.

"I have always been especially pleased with your aggressiveness as typified in the new and splendid improvements in your magazine. It is expressive of all that you stand for in the great work of forestry in our country."

JACOB M. HOFFMAN,
Johnstown, Pennsylvania.

"I take pleasure in writing of my appreciation of the AMERICAN FORESTRY MAGAZINE."

MISS C. T. LAWRENCE,
Stockbridge, Mass.

"Permit me to congratulate you on the improved appearance of AMERICAN FORESTRY."

E. F. SANDBERG,
Chicago, Illinois.

"Permit me to congratulate you upon the great improvement in the appearance and contents of AMERICAN FORESTRY. The magazine has now become thoroughly worth while and the credit for this belongs to you."

PROF. A. B. RECKNAGEL,
Ithaca, N. Y.

"I prize the magazine highly."

NICHOLAS E. CROSBY,
Pine Hill, Ulster Co., N. Y.

"We commend and wonder at the far-reaching and teaching improvements of your work."

GEORGE A. GODDARD,
Boston, Mass.

"The change of plan and scope of purpose of the AMERICAN FORESTRY MAGAZINE is manifesting itself. You are getting out splendid issues. A long reach to your arm and success to your efforts!"

CARL BANNWART,
*Secretary, Shade Tree Commission,
Newark, N. J.*

"We think AMERICAN FORESTRY exceedingly interesting. It is read eagerly each month by a large family and we interest all we can to become members."

MRS. M. LEITCH,
Poughkeepsie, N. Y.

"Your magazine, in my opinion, is very attractive and interesting. The articles are well written and the illustrations beautiful."

MISS ALICE M. LONG,
*573 Considine Avenue,
Cincinnati, Ohio.*

"I would like to add my small word of approval and congratulations for the very marked improvement of the last few numbers of the AMERICAN FORESTRY, especially of the photographs."

JOSHUA A. COPE,
Coeur D'Alene, Idaho.

"I think the magazine is something of which we can justly be proud and we all ought to do our part toward improvement."

H. L. CHURCHILL,
Forester, Glenn Falls, N. Y.

"The magazine has been much improved lately; it is fine."

EMANUEL FRITZ,
*Federal Building,
Missoula, Montana.*

"The magazine is certainly fine."

R. E. BENEDICT,
Victoria, B. C.

"The last number of the magazine is most exceptional and full of very interesting items. Items being shorter, newsy and of more variety."

CHARLES N. DIETZ,
Denver, Colorado.

"I find the magazine very interesting and instructive, from both the technical and lay point of view. To my mind it has been steadily improving, month by month."

MRS. F. H. MILLEN,
Ithaca, N. Y.

"AMERICAN FORESTRY is coming to the front and should have the support of all forestry people. The pictures are fine."

R. C. HUEY,
Hot Springs, Arkansas.

Canadian Department

BY ELLWOOD WILSON

*Secretary, Canadian Society of Forest
Engineers*

The main features of January were the meetings in Ottawa of The Commission of Conservation, The Canadian Forestry Association, The Canadian Society of Forest Engineers and the Canadian Lumbermen's Association. The Dominion Conservation Commission, besides papers on other different aspects of conservation, had three papers on Forestry, the report of its forester, Mr. Clyde Leavitt; one by Dr. Fernow on "Silvicultural Problems of Forest Reserves"; one by the director of Dominion Parks, on "Forest Fire Protection in Dominion Parks," and one on "Fire Protection from the Standpoint of the Private Timber Holder."

The meeting of the Canadian Forestry Association was a very interesting one; a most interesting paper, illustrated by slides, was read by W. R. Brown, of Berlin, N. H., on the woods operations of his company and on the by-products manufactured by them from waste materials. Probably the most interesting product is "Kream," a substitute for lard in cooking, which is purer, more wholesome and more economical. He said he had nine chemists constantly at work trying to discover new uses for materials now wasted at their plants. This firm is a pioneer in the new efficiency methods and in scientific management of the highest type.

Mr. S. L. de Carteret, president of the St. Maurice Forest Protective Association, gave an interesting talk on the work of that institution, and Mr. E. J. Zavitz, forester for the Province of Ontario, read a paper on his work of reforesting drifting sands, waste lands and the distribution of trees to farmers and also spoke of his work in combating tree diseases.

The meeting of the Canadian Society of Forest Engineers was the largest ever held. It began with a "get-together" dinner, after which the business meeting was held, a new type of tree caliper, the invention of one of the members, was shown, and then a general discussion took place on the methods best adapted to the handling of the new forest survey of New Brunswick, about to be begun under the direction of Mr. P. Z. Caverhill, a member of the society. Among the guests of the evening were Dr. Bates and two members of his staff from the Dominion Forest Products Laboratory in Montreal. Mr. Gutches, director of the New York State Ranger School, was also among the members present.

The meeting of The Canadian Lumbermen's Association was largely attended and much interest was shown. The question of using Norway pine for wood paving blocks aroused much interest.

Mr. P. Z. Caverhill has finally completed his arrangements for taking charge of the forest survey of New Brunswick and will begin his work shortly.

The annual meeting and dinner of the St. Maurice Forest Protective Association took place at the Windsor Hotel in Montreal on Thursday, February 10. This was the fourth annual meeting and the Association can justly be proud of its record.

A postal card has been received from H. R. MacMillan, British Columbia's chief forester, from Mombasa, British East Africa. He says that there is plenty of woodland but no merchantable timber. Mr. MacMillan is going next to India and then to China and Japan in the interest of the wood-using industries of his province.

The Northern Electric Co., of Montreal, had a very interesting exhibit of telephones for forest use. They have gotten out a new portable phone like those prepared for the U. S. Forest Service and also an iron box containing a telephone outfit which can be fastened on a tree. This will be great aid in fire protection.

It is said that in the spring the Norwegian Government will send a party of foresters to Canada to investigate forest conditions.

Mr. A. Holmgren, of Ostersund, Sweden, formerly in charge of the Government Ranger School at Bispagarden, has just published a book. Mr. Holmgren made a trip through Canada about three years ago and is one of the leading foresters of Sweden.

The New Brunswick Railway Company, at the suggestion of their forester, R. R. Bradley, will begin planting operations in the spring.

Sr. Don Ricardo Codorniu, editor of *España Forestal*, is doing work of which his country, Spain, should be justly proud. His journal is already one of the best gotten up of the European papers, and the articles are of great interest.

Mr. W. C. J. Hall, chief of the Forest Protection Branch of the Quebec Department of Lands and Forests, is advocating the use of aeroplanes for fire detection in the woods. There is no doubt that this is the ideal method and easy to use on account of the large number of lakes and rivers.

It is reported that there is an outbreak of white pine blister rust in Maine and

traces of it in Ontario. This is bad news, and it is to be hoped that the authorities will act promptly to suppress it before it assumes large proportions. This will also be the most economical procedure.

Mr. R. O. Swezey, consulting forester of Montreal, and at present serving as instructor at the Royal Military College at Kingston, Ont., has been elected an associate member of the Canadian Society of Forest Engineers.

A most interesting monument is being erected to the memory of Herzl, a prominent Zionist. He did much to better conditions in Palestine and to forward the Zionist movement, and his friends are planting a grove of ninety thousand olive trees to commemorate him and his work. A far better monument than a statue.

Mr. G. C. Piché, chief forester of Quebec, has been very successful with his sales of stock from the Government Nursery at Berthierville, one sale of two hundred and fifty thousand trees having been made to one firm. A graduate of his school, Mr. Gareau, has been engaged as forester by Mr. Snowball, head of one of the largest New Brunswick lumber companies.

Mr. A. E. Warren, assistant to the general manager of the Canadian Northern Railway System, has a very interesting article in the last number of the *Canadian Forestry Journal*, describing the methods of fire protection on their lines. The Canadian Northern has attacked the problem of railroad fires with vigor and deserves much credit.

The Great Eastern Railway of England has recently, at the request of the British Columbia Government, carried out some experiments with Douglas fir and red cedar ties alongside of ties obtained from the Baltic. These timbers showed great superiority over those from Russia and it is hoped that the English and Indian railways will take their supply from western Canada.

The Canadian Forestry Association has inaugurated a free cut and cartoon service to all the newspapers in Canada to aid in its propaganda work. These are being gladly received by the newspapers, and will be a great help in educational work. Nothing strikes the eye and attracts the attention like a good picture and the impression is superior to columns of print.

The Forester's Club of Ottawa, at the last meeting, tried an innovation which was very successful, inviting forest administrators and lumbermen to attend. This was very successful and will be continued, as such meetings do much to bring the lumbermen and the foresters into closer touch and show them how much they really have in common.

British Columbia Notes

Victoria, B. C.—The investigation now being made by the Federal Trade Commission into the conditions of the lumbering industry has brought out in an emphatic way the opinion held by American lumbermen that far more is being done to help the industry on the British Columbia side of the boundary than in the United States.

"British Columbia," stated counsel at the recent hearing at Washington, D. C., "is laying the foundations of a preferential tariff. An active virile commonwealth producing the same commodity and competing in the same markets is aiding its own lumber industry in every reasonable way. Officials there are progressive and awake to the opportunities of the day."

The brief filed with the Commission by the West Coast Lumber Manufacturers Association states: "There is no question as to the British Columbia Governmental policy toward the industry. It appears in every law and in every act. The attitude of the Forest Branch is best expressed by its representative: 'It is our business to help the industry in every possible way. We are practically in partnership with it.' This extends not only to export, but to domestic trade as well. The entire subject is handled methodically and intelligently with the fixed and definite purpose of furthering and fostering the industry in every possible way."

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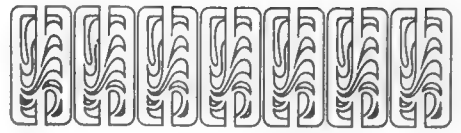
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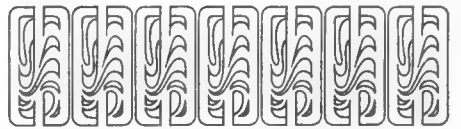


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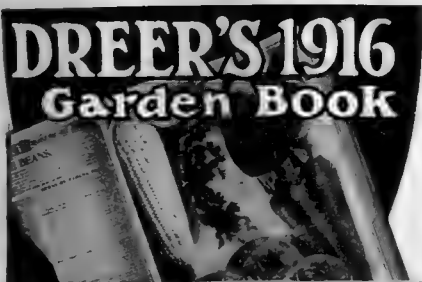
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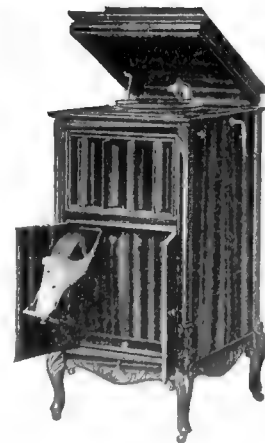
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American Forestry

Vol. 22

APRIL, 1916

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IT IS INDEPENDENT, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.

IT ASSERTS THAT forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.

IT DECLARES THAT FORESTRY is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars' worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.

IT RECOGNIZES THAT forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.

IT WILL DEVOTE its influence and educational facilities to the development of public thought and knowledge along these practical lines.

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State Activity by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners, non-political departmentally independent forest organization, with liberal appropriations for these purposes.

Forest Fire Protection by Federal, State and fire protective agencies, and its encouragement and extension, individually and by cooperation; without adequate fire protection all other measures for forest crop production will fail.

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American Forestry

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No. 268

The Birches

BY SAMUEL B. DETWILER

"The birch, most shy and ladylike of trees."—Lowell.

THE birches are among the most graceful of our trees. At all seasons they possess a quiet charm that seldom fails to win the admiration of the lover of nature. Besides being highly prized for ornamental purposes, several kinds furnish wood valuable for lumber and many other uses. Birch bark supplies a fragrant oil employed by the Russians in tanning leather; the oil is also used for medicinal purposes and flavoring. Birch beer, made from the sweet sap of some species, is a palatable drink. Thick sheets of birch bark served the Indians for canoes, shoes, boxes and coverings for their lodges. The bark burns readily, and is used by the woodsman to start camp fires, and for torches. Thin layers of bark are sometimes used for paper; twenty-three hundred years ago the books of Numa Pompilius are said to have been written on birch bark.

Superstitious persons in times past have relied on the powers of the birch tree to guard them from lightning, wounds, gout, caterpillars and "the evil eye." Many a country schoolboy who has been commissioned to a cut a switch for his own punishment "from that sour tree of knowledge—now a birch," may not have appreciated the fact that this is a time-honored use of this tree. There is a legend that one dwarf variety never regained its size after Christ was beaten with sticks which it furnished. The Russian believes the birch tree to be a symbol of good health, and in taking a sweat bath, he is flogged with birch switches until he perspires.

The birches, except one South American species, are inhabitants of cool, northern regions and several kinds, as shrubs, reach the borders of the Arctic Circle. About thirty-five species are found in various parts of the world, and fifteen are

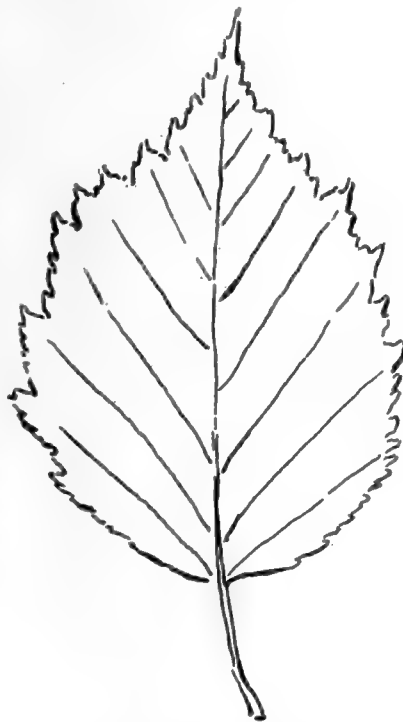
native to North America. Of the latter, nine develop into trees and six grow only as shrubs.

Paper birch (*Betula papyrifera*), often called canoe birch, white birch or silver birch, is usually less than 75 feet high and 18 inches in diameter. It is one of the few trees of our country that grows from coast to coast. Botanists distinguish several forms of this species; one variety or another is found from Labrador to Alaska and south to Pennsylvania, Michigan, Colorado and Washington. It grows on moist slopes, and bordering lakes and streams. When not crowded, it has an open, irregular, rounded head, but in the forest the top is small and the stems straight and clear. The surface of the bark is chalky-white and can be separated into parchment-like sheets. The inner bark

is darker, usually a cinnamon color when fresh, but blackened after long exposure. The white outer bark, once removed, never forms again, and the beauty of the tree is marred; if a thick layer of bark is peeled, exposing the sapwood, the tree dies. Because of its thin bark, paper birch is very easily killed by fire.

The paper birch is the "glad" tree of the northern woods because it brightens and brings cheer to the dark places of the forest. Wherever it grows it adds the crowning touch of beauty. Its white bark gleams in striking contrast against a background of evergreens, but to learn the magic spell of this tree one must go deep into the woods and watch the wonderful play of light and shadow as the sunlight of a clear summer day ripples through the foliage.

The scientific name of white birch (*Betula populifolia*) means the poplar-leaved birch; this name is given because its leaves continually flutter in the slightest breeze, like those of the poplars. It is called old



WHITE BIRCH LEAF

The leaves of all species of birch are very much alike. They occur singly or in pairs, but never stand opposite each other. They are like an arrow head in shape and have saw-toothed edges.

field or poverty birch because it so quickly takes possession of abandoned fields in New England. Gray birch is also a common name, derived from the color of the outer bark, which has a grayish cast—a much duller white than that of paper birch. It cannot be peeled off in papery layers. Beneath each side branch is a V-shaped black blotch. The twigs are more slender and droop even more gracefully than those of paper birch; they are also much more noticeably roughened by resinous dots on the surface of the bark.

White birch is always a small tree, seldom reaching a greater size than 25 to 40 feet in height, and a foot in diameter. It grows from Nova Scotia to the southern shores of Lake Ontario, and south to Delaware, principally along the coast. It is found most frequently on dry, gravelly soils, but occasionally in moist ground. It is a sun-loving, vagabond tree, quickly taking possession of burned forest areas or abandoned fields, but is short-lived and unable to compete

with other trees that spring up in its grateful shade.

The European white birch (*Betula alba*) is often planted for ornament and is the only other tree that is liable to be mistaken for either white or paper birch. It is so closely related to paper birch that the latter is generally considered a botanical variety of the European species. A very common form has "weeping branches," another has finely divided "cut" leaves. The bark at the base of large trunks has deep, dark-colored furrows. The outer bark has the chalky whiteness of paper birch, but does not so readily separate into thin layers.

Sweet birch (*Betula lenta*) is also known as black or red birch, cherry birch and mahogany birch. It ranges from Newfoundland to northwestern Ontario, southward to southern Illinois and along the Allegheny Mountains to western Florida. Its average size is 50 to 60 feet

high and 1 to 3 feet in diameter, but it occasionally grows 80 feet high and 5 feet through. Old trees with plenty of space for growth develop handsome, spreading tops, with heavy, twisted branches and an abundance of slender, pliable twigs. In the forest, mature trees have clear and fairly straight trunks and rounded, rather broad and heavy-branched tops. Young trunks and branches have smooth, shining bark of a dark reddish-brown color, looking much like the bark of the common sweet cherry. Old trunks are covered with large, thick, irregular plates of bark, the edges of which curl stiffly back. The bark does not peel in papery layers, but is smooth on the surface between the furrows and is dark brown, almost black, in color. The inner bark gives the best clue by which to identify sweet birch. It has a fragrant odor and a strong flavor of wintergreen. Indeed, sweet birch bark formerly produced most of the commercial oil of wintergreen. The pleasant-tasting bark is not the only delightful tid-



WHITE OR PAPER BIRCH

1. Flowering branch with immature leaves, (s) staminate flowers, (p) pistillate flowers; one-half size.
2. Branch with mature leaves, fruiting strobiles and partly developed staminate aments; one-half size.
3. A winged seed.
4. A strobile scale, enlarged.
5. A winter branch.
6. Section of lateral winter spur-branch, enlarged.
7. Section of a terminal winter branch, enlarged.

bit this tree supplies to the woodsman. The sap is sweet and inviting, either in its natural state or when brewed. Strips of inner bark, dried in the spring when it is rich in starch and sugar, have been used for food.

Yellow birch (*Betula lutea*) is an important timber tree of the northern forests. It grows on rich, moist, well-drained soil from Newfoundland to southwestern Ontario and northern Minnesota south to Delaware, and in the Appalachian Mountains to North Carolina and eastern Tennessee. Its ordinary size is 60 to 80 feet in height, and 2 to 3 feet in diameter. In form it closely resembles the sweet birch, but tends to have a more spreading habit. Its bark has a distinct dingy yellow color and the outer portion can be pulled away in thin, filmy ribbons. Young trees have smooth, glistening, silvery bark, and for this reason the tree is called by some



AREA OF BIRCH GROWTH

Alaskan white birch (*Betula alaskana*) is also a small-sized tree. It resembles paper birch and in portions of Alaska it is quite abundant on sunny slopes. It grows from the Saskatchewan valley to the valley of the Yukon River.

The different species of birch have a number of points in common. The bark has peculiar horizontal markings due to the lengthening of the breathing pores as the tree grows in diameter. The buds are small, pointed, and covered by overlapping scales of various shades of brown. They stand singly and have an alternate arrangement on the stem. The leaves of all species are very much alike in appearance and occur singly or in pairs, but never stand opposite each other. They resemble an

the silver birch. A little later in life the bark becomes tinged with yellow and the surface is broken in long lines and rolls back in a ragged fringe. Large trunks, especially near the base, lose most of the tattered silvery-yellow bark, becoming dark gray or reddish, and roughened by deep, irregular furrows and thick plates. The bark of the twigs has a slight wintergreen odor and a bitter taste. The bark burns very readily when dry and is often used for starting camp fires. Dead yellow birch trees are a danger in case of forest fires, because the fire flashes along the shaggy bark to the top of old stubs, and if a high wind is blowing, pieces of flaming bark are carried long distances ahead of the fire to start a new blaze.

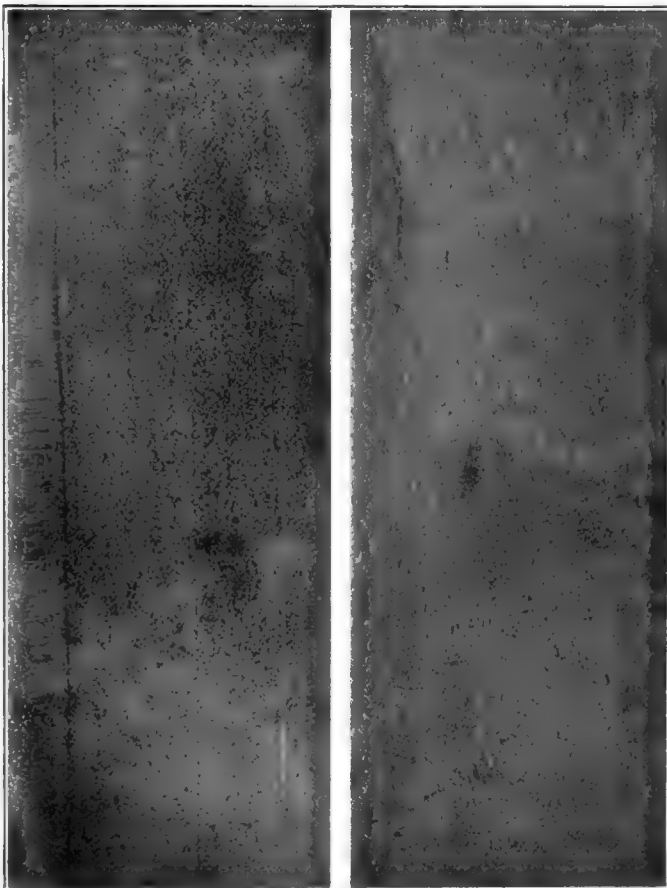
River birch (*Betula nigra*), frequently called red, blue, black or water birch, is a medium-sized tree, 30 to 50 feet high and 1 to 2 feet in diameter, but occasionally reaching a height of 100 feet and a diameter of 5 feet. As its name indicates, it is found along streams and on other moist soils. Nature uses this tree as a dyke-builder, as the matted roots hold the soil deposited along stream banks by floods. It is sometimes planted to prevent stream banks from washing away.

River birch is native from Massachusetts to Florida and west to Minnesota, Kansas and Texas. The bark is even more ragged than yellow birch, and, like the latter, the outer layers peel off in lustrous, silky scales. The delicate pink-brown or chocolate color of the bark separates it easily from all other birches. The twigs are red and shining, and are especially graceful as they droop beneath the heavy masses of dark green foliage.

Western birch (*Betula occidentalis*) is a tree 100 to 120 feet high, 3 or 4 feet in diameter, that grows very sparingly in northwestern Washington and southwestern British Columbia.

Kenai birch (*Betula kenaica*) is a small tree found only on the coast of Alaska.

Mountain birch (*Betula fontinalis*), as its name implies, is a mountain species. It is a small tree, or more often a shrub, growing from British Columbia to Colorado and west to the Sierra Nevada Mountains of central California.



WHITE OR PAPER BIRCH

Tangential or bastard cut, the common method of sawing this species of wood.

Radial cut (quarter sawn). The pitch rays are quite inconspicuous in the wood because of their small size.

arrowhead in shape and have saw-toothed edges. The pollen-producing and seed-forming flowers are borne on different parts of the same tree. They appear in early spring before or with the leaves. The pollen-producing flowers are long, tassel-like bodies with a yellow or brown tinge, and hang down from the ends of the twigs. The greenish seed-forming flowers appear below those that produce the pollen and are rather small and slender, standing nearly erect. The fruit is a narrow cone-like structure one-half to three inches long. The scales which compose the fruit bear tiny, flattened chestnut-brown nuts. These nuts are provided with two small,

thin wings, by means of which they travel long distances through the air.

Paper birch and white birch have especially light seeds and for this reason are among the first trees to come up where forest fires have killed the vegetation. The natural germinating bed for seeds of sweet and yellow birch is the ground of an old forest where there is plenty of shade and moss. Where birch trees grow near streams, great quantities of seed are carried by the water to points remote from the parent trees. The birches bear seed in abundance, but the seeds must be kept moist after they fall or they lose their vitality. River birch ripens its fruit about June; the other species ripen and scatter their seeds in the autumn.

In mid-summer it is not unusual to find the ground near river birch-seed trees entirely carpeted with birch seedlings 2 or 3 inches high. Near a group of river birches growing in the Mississippi River bottomlands in Wisconsin, 19,790 birch seedlings, three months old, were counted on a plot 6.6 feet square. At this rate nearly 20,000,000 seedlings were growing on a single acre. Another plot measured in a nearby thicket of 3-

year-old seedlings, 2 to 4 feet high, proved that 137,000 seedlings of this size would grow on an acre. In a similar birch thicket where the trees were about 17 years old, 3,270 trees were still living in spite of their fierce fight with each other for the soil and sunlight necessary for their growth. They ranged in height from 25 to 50 feet. The majority were only 1 to 3 inches in diameter, although a few measured 5 inches. Properly thinned, according to the principles of forestry, this stand of 17-year-old trees contained only 660 trees per acre. It was found that such thinning more than doubled the rate of diameter growth of the trees that were left.

All kinds of birches grow rather slowly, but rank high for planting for ornamental purposes. The best for this use are paper birch, European white birch, sweet birch and river birch. They have a finely divided, spreading-root system that makes them easy to transplant. All grow best in rich, well-drained soil, but do well in dry, sandy land. River, yellow and sweet birches can be planted successfully in rather moist locations. The white birches are comparatively short-lived, especially when growing in dry soils, and are frequently subject to attacks from bark and wood borers.

The Products and Uses of Birch¹

THE birches hold an important place in the list of American timber trees. Sweet birch and yellow birch are by far the most valuable, but the paper, gray, and river birches have a variety of practical uses. The species found in the western part of North America are too small or of too scattered growth to be commercially important. The wood of all birches is heavy, hard, strong and of fine texture. The sap wood is white; the heartwood has a pleasing brown color tinged with red or yellow. The wood shrinks considerably in drying and is not durable when exposed to the weather. However, it works well, and because of its beautiful satiny luster it is exceedingly handsome when polished.

Sweet birch lumber is produced in commercial quantities in all of the States east of the Mississippi River except Illinois and the Gulf States. It nowhere forms extensive stands but is found mixed with other hardwoods. Because of its valuable qualities, the supply of sweet birch is being steadily diminished. In the early settlement of the country the fertile tracts where some of the finest sweet birch grew were cleared for farms and the logs were burned. Birch is an ideal firewood and large quantities were used for fuel from Maine to Michigan, before the value of the wood was realized. During the past thirty or forty years the sawmills have been cutting sweet birch and what now is left is a mere remnant of the former supply.

The wood of sweet birch is stiff and strong and the principal objection to its use arose through the diffi-

culty which was experienced in seasoning the lumber since it warped badly. Probably the most important use for birch lumber at the present day is for various kinds of furniture. The advantages of the wood for this purpose are that it is dense and even-grained, has good milling qualities, and will take and hold almost any kind of finish. Boston furniture makers very early discovered that sweet birch wood could be treated so as to imitate mahogany in appearance. It can also be treated so that it closely resembles cherry. The dark red heartwood is so beautiful that today it is not necessary to sell it under a false name, although this is often done. As a furniture wood, chairs of all descriptions consume the largest quantity of sweet birch lumber. Desks, church fittings, tables, cupboards, bookcases and filing cabinets are a few of the important articles of furniture made wholly or in part of this lumber.

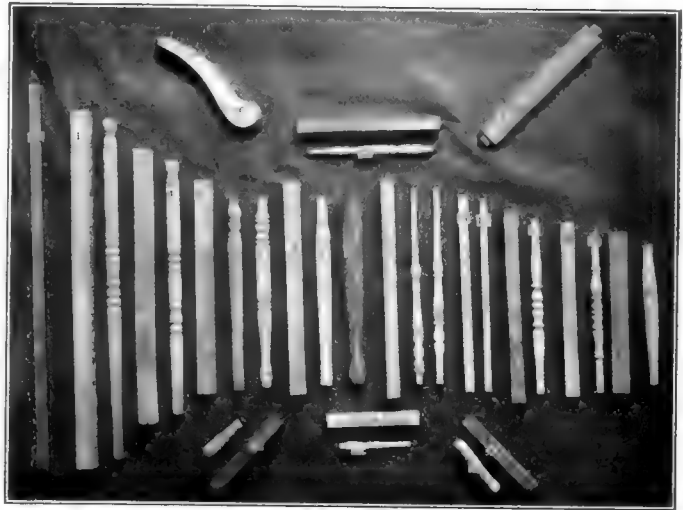
The beauty of sweet birch has caused it to be selected for the outside wood of many musical instruments. Its hardness and strength make it valuable for piano hammers, the framework of pianos, and pipes for organs. Almost every kind of musical instrument in which wood is used has drawn upon sweet birch for material. This wood holds quite an important place as a vehicle wood. It is sometimes used in the bodies of automobiles and fine carriages, and also in other parts of automobiles such as seat frames, floors, dash boards, steering wheels and spokes. Although used for the hubs of light carts and buggies, it is not so good as elm and oak for this

¹The information contained in this article is drawn largely from Bul. 12, U. S. Dept. of Agriculture.

purpose. Birch is also employed to a considerable extent for panelling in railway cars.

The wood of sweet birch makes a handsome and durable floor, if it is thoroughly seasoned when laid. It is a choice lumber for finishing the interior of high-class dwellings. Such use includes ornamental columns, newel posts, stair rails and spindles, moldings, mantels, window and door frames. Doors made of sweet birch are especially attractive. Wood with a curly or wavy grain is often used in this class of work. Much sweet birch lumber is also used for ceiling and wainscoting. It is a favorite wood for finishing and fixtures in offices, stores, banks, bars and hotels.

In the manufacture of artists' materials this wood is selected for easels, rules, palettes and panels for oil painting. Considerable birch is used in the finish of high-



BIRCH PRODUCTS

The annual consumption of yellow and sweet birch by the furniture industry amounts to over 50,000,000 feet. This material is purchased in the form of lumber and dimension squares and is used for all types of both house and office furniture. Birch when properly finished makes a splendid imitation for mahogany, and is often treated in this way.

Lake States it is a highly important lumber-producing tree. As a furniture wood it is not considered the equal of sweet birch, but cannot be easily distinguished and is much used. The natural grain of the wood, when finished, is not as soft and lustrous as that of sweet birch, but the furniture made from it is handsome, strong and substantial. It is used both as an outside and inside wood in the manufacture of desks, tables, stands, chairs, benches, filing cabinets, and fixtures for stores, offices, banks and bars. In the manufacture of vehicles yellow birch is well fitted for certain uses because it is hard, strong and stiff, and is employed in much the same manner as sweet birch. It enters to a large extent into the manufacture of wooden dishes and handles of many kinds; also pill boxes, school supplies and other novelties. The miscellaneous uses of yellow birch range from grain doors down to toothpicks. For most purposes either the sweet birch or the paper birch is preferred to yellow birch, but wherever the latter is used it gives good satisfaction because it is one of the stiffest and strongest woods obtainable.

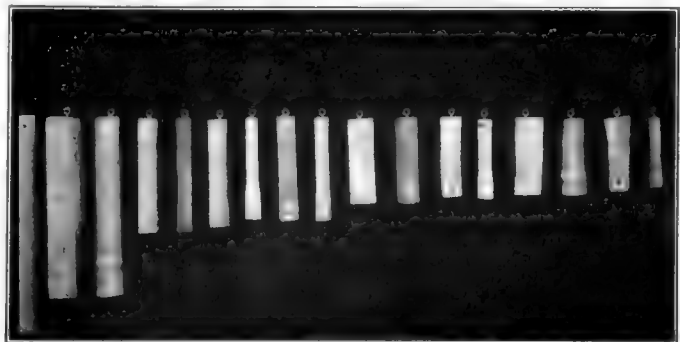


ALL THESE ARE MADE OF BIRCH

Birch is highly prized as raw material for novelty turnings. One factory alone manufactures nearly 1,000 different articles. The photograph shows turned boxes, buttons, spools, shoe tree plugs, etc., made from paper birch.

class canoes, motor boats and yachts. It is a favorite for billiard tables and cues and even billiard balls. Dumbbells, Indian clubs, croquet mallets and balls, and building blocks, and similar articles are mostly made of birch. Since the European war the demand for gunstocks has been so heavy that this wood has been extensively substituted for walnut. It also enters into the manufacture of agricultural implements, broom and brush handles, tackle blocks, picture frames, tripods, instruments and tools. It is used to some extent in slack barrels, woodenware, coffins and work benches. A long list of other uses might be mentioned.

Yellow birch is not so widely distributed in the United States as the sweet birch, but in New York and the



BIRCH IS HIGHLY PRIZED AS A TURNING WOOD

For this reason it is extensively employed in the manufacture of twisters, speeders and bobbins for use in textile mills. The photograph shows various styles of these articles in the rough and the squares from which they are made

Yellow birch and sweet birch, with beech, furnish 90 per cent of all the hardwood used in destructive distillation in the United States. Mill waste and cordwood from material that remains in the woods after logging are carried to large plants, where the wood is heated to a high temperature in retorts. Wood alcohol and acetic acid are driven off in gaseous form by the heat, and the vapors are then condensed and purified. The



BIRCH READY FOR THE MILL

Log pond of a large Wisconsin sawmill containing several million feet of hardwood logs ready to be manufactured into lumber and other timber products. A large majority of these logs are birch.

charcoal which remains in the retorts is used as fuel for the home, bakeries and shops; in blast furnaces; in the manufacture of gunpowder, and for filtration in sugar refineries. The wood alcohol is used for fuel, but principally as a solvent in making varnishes and shellacs, and in the manufacture of dyes, artificial leather and other commodities. The acetic acid is recovered as acetate of lime and is then refined to make ether, acetone, acetic acid and wood vinegar. Acetone is a necessity in the manufacture of smokeless powder.

The wood of sweet and yellow birch is so hard and strong, resisting the cutting of the rails, that it is now in demand for railroad ties. Since the wood in its natural state will decay in three or four years after it is placed in the ground, the ties are creosoted before they are put in the track. At the creosoting plant, after the bark is removed, the ties are loaded on trucks and run into long steel cylinders. The ends of the cylinders are tightly closed and creosote oil is pumped into them and forced into the ties under pressure. The creosote penetrates deep into the wood and prevents fungi from attacking and rotting it. The life of the tie is thus increased to 12 or 16 years, or more.

Paper birch is at present commercially most important in New England, but Minnesota has a large supply that offers excellent opportunity for development. This wood is of medium weight and hardness, strong, tough, close grained and of uniform texture. Green wood is

heavy and hard to handle on account of the sap, but when dry it becomes fairly light in weight. The wood rots very quickly in contact with the ground. The bark is durable, because the oil it contains keeps out moisture and prevents rapid decay. The appearance of the bark often gives a clue to the quality of the wood. Trees with dark-colored, close bark are apt to have tough, stringy wood, while those with chalky-white, papery bark generally have smooth, easily worked wood. Its even grain and smooth, clean surface when worked, its ability to hold its shape after seasoning, combined with the ease with which it can be shaped on the lathe, makes paper birch especially valuable for the manufacture of spools, shoe pegs, shoe shanks (used in moulding the instep of certain styles of shoes), dowels, toothpicks and many wooden novelties where a nice finish is required. More than half the cut of paper birch in New England, exceeding 40,00 cords per year, is manufactured into spools. About 3,000 cords are used in New England each year in the manufacture of toothpicks, furnishing more than half the total output. Wood for this use is specially selected and is worth \$20 to \$25 per cord. Wooden boxes for tacks, face powder and salves, one-piece trays, curtain rings,



Photograph from *American Lumberman*.

A TYPICAL PIECE OF BIRCH TIMBER

A yellow birch butt log lying in the forest ready for removal to the sawmill. This is typical of the timber which the forests of Wisconsin produce.

clothes pins, pail handles and hundreds of similar articles are very largely made of paper birch.

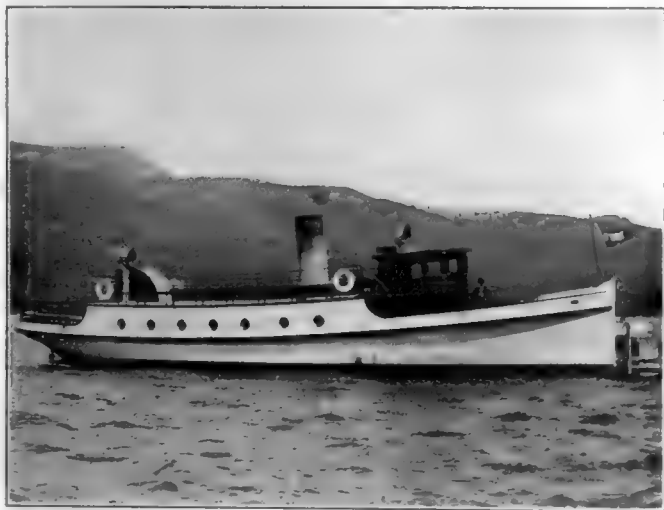
The wood is too soft for hardwood lumber and not sufficiently striking in appearance to be popular for furniture or interior finish. It is too perishable for use in the open without preservative treatment. It is adapted

for making paper pulp, as are the other birches, but the supply is not large enough to make this use important. Some of this wood is also employed in the manufacture of excelsior, and for staves, heading and hoops for slack cooperage. For turnery and many other uses the white sapwood only is used. Trees 5 or 6 inches in diameter, growing under favorable conditions, are practically all sap wood, but larger trees begin to form heartwood, which has an objectionable red color—the so-called “red heart”—that reduces the value of the wood.

The Indians and early settlers used the bark of paper birch for berry buckets and containers for maple sugar, by stripping it off in rolls the size of a stove pipe or larger. Many thoughtless berry pickers still follow the custom, thereby causing the death of many trees. The Indian not only frequently covered his lodge with sheets of paper birch bark, but made the famed birch-bark canoes of it. These canoes were ribbed with cedar and then covered with large sheets of bark. The seams were sewed with threads made of the roots of spruce or cedar and closed with the pitch from Balm of Gilead. John Burroughs writes:

“The great triumph of the birch is the bark canoe. The design of a savage, it yet looks like the thought of a poet and its grace and fitness haunt the imagination. I suppose its production was the inevitable result of the Indian’s wants and surroundings, but that does not detract from its beauty. It is, indeed, one of the fairest flowers the thorny plant of necessity ever bore.”

The principal use of the bark today is for souvenirs, in which there is a considerable trade.



GLACIER PARK LAUNCH FINISHED IN BIRCH

In boat building a little over one million feet of birch is used annually, the wood being employed principally as interior finish for cabins of motor boats, launches and similar pleasure craft.

White birch is found in commercial quantities in New England and northern New York. It has light, soft, weak wood, which decays quickly when exposed to the weather. It is used quite extensively in the manufacture of tools, shoe pegs, barrel hoops and wood pulp, and like all other birches is often cut for fuel.

River birch is as plain a wood as can be found in the forests of this country, and all its uses are based

on service or convenience. In Louisiana it is considered one of the best obtainable woods for ox yokes, many of which are needed in lumbering operations. It is stronger and stiffer than white oak, and much lighter. It is also used to some extent for slack barrel headings and for the bands which stiffen the tops and sides of peach baskets. The wood bends in a satisfactory manner, which



BIRCH FOR INTERIOR TRIM

Birch is extensively employed as interior trim in house construction. It ranks eleventh in this industry and can be obtained in any of the various standard forms of finish into which other species of finish woods are manufactured. Birch is especially prized for door and panel work.

is an important point in places where it is cheaper than elm. It makes a desirable flooring where hard service rather than handsome appearance is a requirement, as in warehouses, barns and factories. It is employed as a furniture wood for frames or to be overlaid with a veneer of more expensive woods. It is also a common wood for all kinds of woodenware, such as picnic plates, butter dishes, kitchen utensils, small handles, washboards, and ironing boards. It is light wood, impervious to water and easy to work.

VERMONT ACQUIRES LARGE AREA

THE Vermont Forestry Department has just concluded the purchase of a tract of about 2,000 acres lying on the east side of Mount Mansfield. This property, added to the one acquired a year ago on the west side of the range, makes the total area about 5,000 acres. The Mansfield Forest thus becomes not only the largest State forest in Vermont, but, next to the Crawford Notch forest in New Hampshire, the largest in New England. It is understood that the State of New Hampshire paid \$100,000 for the Crawford Notch property of 6,000 acres, while the Mansfield Forest will cost Vermont about \$13,500. However, in the former case the timber was included in the purchase, whereas funds were not available for the Vermont Forestry Department to purchase the merchantable timber. A fairly satisfactory arrangement has been made by the State Forester with the grantors whereby they agree not to cut spruce and fir trees which are less than 10 inches in diameter; and hemlock and hardwoods less than 15 inches, all trees to be measured at breast height.

The Grand Canyon of the Colorado

BY MARK DANIELS

Former Superintendent of National Parks

FOR years I have read descriptions of the Grand Canyon with about the same feeling one would peruse Joe Miller's joke book. I have marveled at the conceit of those who had the temerity to essay the task and laughed at their frantic efforts to convey something of its impressiveness by the mere use of words. Icarus, with his wings of wax, was not more presumptuous, though he came nearer to attaining his ambition. Yet, here am I, after marveling at the courage of those who have so fearlessly launched their frail bark of metaphor upon the tossing sea of description, engaged upon the selfsame task. I am free to state, however, that mine is the valor of ignorance.

Senator James D. Phelan said, in speaking of his native State, "You can't tell the truth about California

without lying about it." If this is true about California, and nothing has occurred to my knowledge to justify a doubt of the Senator's veracity, it goes double for the Grand Canyon. With the Senator's recital as a premise, any little statement which may here appear that cannot be verified will be considered, I hope, as one made in order to bring out the truth about the Grand Canyon.

The average person's conception of a canyon is a gorge in which a river runs through the mountains. Mountains in some way seem to be part and parcel of a canyon. The first feature at the Grand Canyon which strikes one, therefore, is the almost absolute level of the surrounding territory. One begins to wonder why the water did not spread over the landscape and thereby fail to cut a channel. It is these very level rims that add



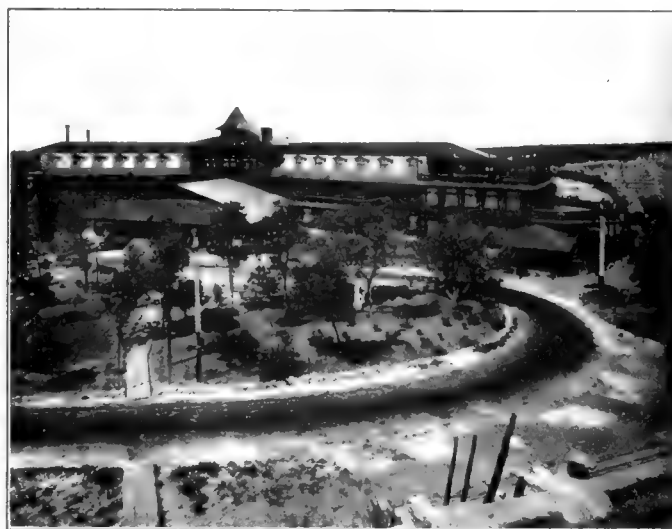
LOOKING NORTHWEST FROM NEAR PIMA POINT, GRAND CANYON

This photograph, better perhaps than any other in this article, gives an idea of the tremendously impressive sight of the yawning gorges and the majestic boldness of the canyons, peaks and plateaus.



HERMIT'S REST

This attractive place, from which there is a glorious outlook, is at the head of the Hermits Rim road.



THE EL TOVAR HOTEL

From the windows, porches and grounds around this hotel one may see miles of the Canyon, and if no other view that is obtained here was to be had the trip would be well worth while.

so much to the grandeur of the spectacle, for they admit of a sweep of the vision up and down the canyon for many miles.

The Canyon proper is over 60 miles in length, from 10 to 14 miles in width and of an average depth of

4,400 feet in the vicinity of El Tovar. I have been advised that the above is about as far as any sane individual should attempt to go with serious description of this subject, but, like the sirens of old, the coral cliffs, yawning abyss, glorious gehenna, towering temples and such like phrases sing their irresistible song that leads to literary destruction. There are really two canyons, one above the other. The lower one is about one thousand feet deep and is in almost solid granite. The walls of this portion are more like the canyons of the Sierra Nevada in California and they form what is called

the "granite gorge." On the rim of this gorge is a plateau which extends backward for a mile or so, gradually merging into the talus piles of the upper cliffs that rise 3,400 feet above the plateau. From the upper rim the plateau, over a half mile below, appears smooth

enough to make an afternoon ride on horseback a delight of cantering and posting, but as a matter of fact it is so rough and broken with piles of boulders as to make a trip over it well nigh impossible. There is a trail, so called, that leads from the Hermit Trail along the rim to the Bright Angel Trail, but from personal experience it is not, in my opinion, advisable to take the trip, although quite a number of people have tried it.

The Canyon bottom is reached by trail in two places, one right below the hotel and the other at a point about 20 miles up the river. These two trails are known as the



Photograph by Fred Harvey

VIEW FROM NEW HERMIT RIM ROAD

Here is to be had one of the most wonderful of the many wonderful views at the Canyon. It is on the way to the new Hermit Trail, which, because it is a much easier descent than the Bright Angel Trail, is yearly becoming more popular.

Bright Angel and the Hermit Trails. The former is perhaps the most terrifying horse trail in America, if not in the world. In many places it is built out from the vertical cliff and overhangs a thousand feet of depth below. While the trail is not as dangerous as some in the Yosemite National Park, or in the Mount Whitney country, it nevertheless possesses those curious characteristics which tend to make one recall the past with that suddenness which leads to prayer. From the upper rim none of those imps of terror are visible and the uninitiated approach the first few yards of the downward trail with just about that degree of nonchalance with which one might expect to see a professional golfer step on to a putting green. But he soon learns that this is no way to "address" the Bright Angel Trail, for his "stance" must be taken from the back of a long-suffering mule.

Since we have fallen into the vernacular of golf, I would say that the carry is one that has never yet been properly estimated. At first glance, and even after some study, the distance seems moderate and the hazards trivial, with few opportunities for putting. The latter, however, is the greatest mistake of all for, with all due

regard to the excellence of the hotel's cuisine, putting is the principal pastime of the novitiate on the Bright Angel Trail. On one trip to the Canyon, I saw an elderly Irishman repeatedly calculating the distance to the bottom. I asked him if he intended to make an attempt and he said he thought he would, that he figured he would have just about enough time to reach the river below and return for dinner. When I remonstrated he said it was an easy matter for him. I watched him start, and about 2 p. m. I saw him, less than a third of the way down, turn and head back. That evening I said to him, "Did you reach the bottom?" "No," he replied, "Oi didn't get as far-r as Oi thot Oi wud—but thin Oi didn't think Oi wud."

Everyone who visits the canyon seems possessed of the ambition to descend to its bottom. No doubt he is led by that same ambition which prompts the average traveler, for the first few days, to order and eat everything upon an American-plan bill of fare. The result, too, is about the same, for after the experiment he frequently can hold nothing on his stomach but his hand. All admonitions of the guide to close the eyes and let the mule do



J. Harvey

LOOKING OVER THE RIM NEAR EL TOVAR HOTEL

about 1,400 feet deep, and it is possible to see up and down the canyon for many of its sixty miles of length. It does not seem so because distances here are difficult to judge. The Bright Angel trail starts close to the hotel.

the work are fruitless. You know you are going to fall off anyway and with your eyes open you may have your downward trip brightened by the sight of others in flight.

To me, the trip down does not enhance the glory of the picture that one carries away after a view from the rim. In fact it detracts from it. The canyon is



THE POWELL MONUMENT

A view of the monument to Major John Wesley Powell showing the altar and bronze tablet. The monument was designed along the lines of the old Aztec sacrificial and ritualistic structures with as little of the elements of modern design as possible.

not a place that invites intimacy. It is a sight to behold, one to study day after day from various points on the rim, and one the contemplation of which is calculated to tax the imagination and inspire the observer. The effect of intimacy is apt to prove iconoclastic. Of course, if a trip in the canyon is approached in the proper spirit and is planned to admit of several days' sojourn in its depths, the real inner spirit of the place is sure to be felt. I can imagine nothing more wonderful than a few nights spent on the lower plateau with the brilliant stars seen above as from the bottom of a well and the moonlight and dark shadows making vast temples and pyramids of the cliffs and buttresses of the canyon walls. But most people do not do this. They merely mount a mule and scream their fainting way down the trail and back again, after which they hustle aboard the train in frantic haste to reach home and tell their friends of the harrowing experience.

The Hermit Trail is a much less terrifying route. It is laid on an easier grade, is fairly wide and seldom skirts the face of the cliff. Were it not for the fact that it leaves the rim at a point some miles from the hotel, it would no doubt be universally patronized. Due to the fact that a certain active and imaginative resident of the State of Arizona has plastered almost all of the canyon with mining claims, it is impossible to build a train from rim to river without his consent. As a result the Hermit Trail only goes as far as the granite rim. The hotel interests wished to continue this trail to the river and to build some comfort stations and a structure to house tourists over night on the lower plateau. Such improvements are greatly needed, and, if made, would receive

the hearty approval of those who love the canyon. But the owner of the claims will not permit any such thing—except for a sum—despite the fact that this is a national monument and supposedly under federal control. Whether any mineral has ever been discovered there or not I do not know. Possibly a trace here and there has been found, but certainly no deposits in paying quantities. But then, possibly this enterprising person is going to transmute the metals or disprove the theory that it is impossible to get blood out of a turnip. I venture to say, however, that if any gold is taken out of these claims, it will not come from "pockets" in the cliffs.

The most serious obstacle to the development of places for accommodating the tourist in the canyon is the lack of water. There are only two or three places above the river in the vicinity of the hotel where water can be had, and at these points the quantity is limited. Of course they are on mineral claims. Nearly everything but the scenery is, but this should not excuse the Government from the obligation to either develop or



ON NEW HERMIT TRAIL

This pathway down the precipitous sides of the Canyon was recently completed and is considered rather easier traveling and less of a strain upon the traveler who may be nervous about descending the steep slopes to the floor of the Canyon.

permit others to open up the canyon to those who would like to go through it in some degree of comfort.

If one is really bent upon doing the trip properly, and is willing to suffer a few frights, there is but one practical route. Start from the hotel and drive along the rim road some 10 or 11 miles to the head of the Hermit Trail. There, after due ceremonials incident to a change in the means of locomotion, some really trustworthy mules will be led forth to serve as the ship of

state. These mules are really possessed of an unusual degree of intelligence. Without dwelling at length in the usual established way upon the subject of these long-suffering beasts, it is only fair to say that while their appearance is not enticing, before the trip is over, for one reason or another, their riders invariably clasp them around the neck several times with an impassioned hug.

The trail from the rim down to the camp on the plateau of the Granite Gorge, if taken leisurely, will prove to

and the increasing heat brings back, with each step, a deeper longing for a return of the cool shades of the night before. If the heat is not disagreeable, the reckless way in which the mule steers you around sharp curves, with swinging rudder hanging over cliffs of dizzy heights, is apt to prove very much so. The trail is none too smooth, and this, coupled with the fact that it frequently runs within a few feet of the cliff, is well calculated to confine attention to that portion of the landscape which is within striking distance. But to one who is accustomed to mountain trails, the scenery is superb. Views up and down the canyon are to be had at every projecting point, with here and there a glimpse of the river below. If a day spent on this trail, with the river over a thousand feet below, and the rim over three thousand feet above, will not jar one's mind back into a normal sense of the relative importance of things, probably nothing will. Mr. Irvin S. Cobb's retort to a certain gentleman of San Francisco about expresses the effect such a trip has upon most people.

Mr. Cobb, so the story goes, was in conversation with this gentleman when it came out that Mr. Cobb had just arrived from a sojourn at the Grand Canyon. In order to leave no doubt in the minds of those present of his own descriptive ability, and to prove that at least two of those present could wield the king's English with eloquence, the gentleman in question began a lengthy and glowing description of the canyon. After introducing



LOOKING EAST FROM HOPI POINT

The Major Powell monument on the rim of the cliff may be seen to possess some of the inconspicuousness which was striven for. The materials are the country sandstone, which fact helps to make the structure blend into the landscape. The location selected commands a superb view and is yet not prominent in the general surroundings. The monument was designed by the author, Mark Daniels, former Superintendent of National Parks.

be a succession of astounding pictures which may be enjoyed with few distractions, and will bring you to the camp in time to admit of a bath before dinner. The plunge is a luxury seldom anticipated but always appreciated. About 400 yards below the camp there is a pool hollowed out of the sandstone, through which the small stream runs. The sides of the pool are smooth and clean and the bottom is sandy. Never was cool water more welcome to tender, burning feet than the crystal-clear water of this little pool. The spot, too, is in the shady depths of a tributary canyon, and screened from the outside world by towering walls of stone. The luxury of it relegates enameled tubs and crash towels to the realm of darker ages. When the stars come out and the moon rises, the place takes on the aspect of a fairy land, weird beyond the dreams of childhood. The next morning begins the dangerous and terrifying part of the trip along the rim of the Granite Gorge. The sun comes out

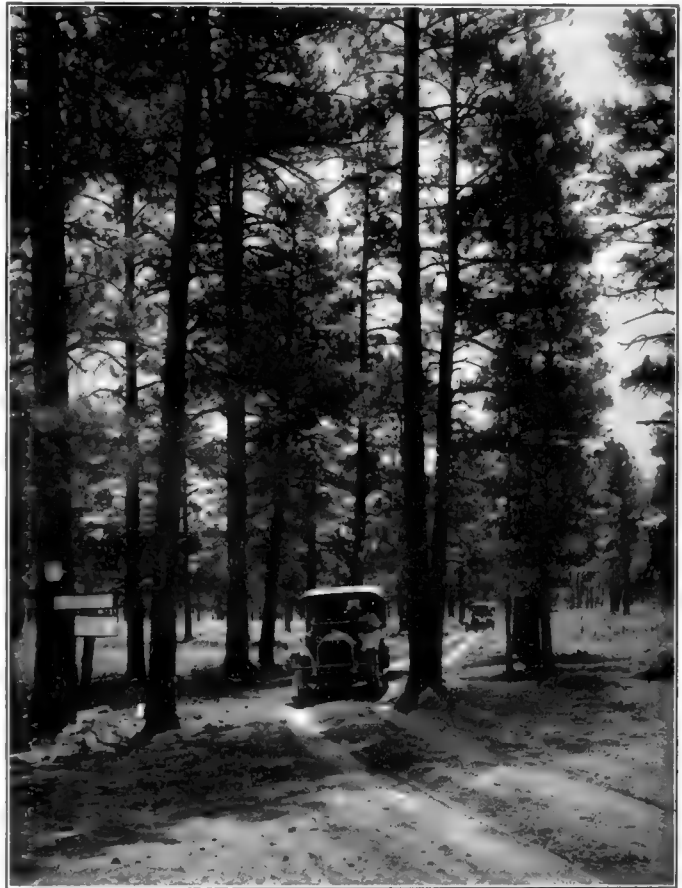
all of the superlatives at his command, he wound up by asking Mr. Cobb if that great yawning chasm, with its unfathomable depths, its towering bastioned walls, et cetera, didn't make him, Mr. Cobb, feel small as he stood upon its noble brink. Mr. Cobb hesitated a moment, and said in his drawling way, "It sure did. In fact, when I got back to my room, I had to climb upon the bureau to shave."

No conscientious or honest description of the Grand Canyon is complete without a note or two on that genus, *homo touristii*, which does its traveling "en costume." Whether this particular variety of the species carries a complete outfit for each stopping place or not cannot be stated, but that the same one will bob up in a different costume in several different places in the same season I can testify. It is not uncommon to see one solemnly stalking the terrace of the hotel on the brink of the canyon fully arrayed in the accepted theoretical version of a

western bad man's costume. High-heeled black boots, corduroy breeches, blue flannel shirt, red silk bandana carelessly tied about the throat, with the knot under the chin, sombrero, with the Montana peak, and, yes, the trusty dagger at the hip or fastened to the belt—these constitute the stock costume. Mr. Brandt, who has for the past eight or ten years devoted his energies to the operation of the hotel and the protection of innocent natives from wild tourists, described the raiment of one who came to the canyon possessed of a fierce determination not to appear conspicuous amongst his western brothers. He wore the regulation boots, shirt, bandana, and in addition, perhaps to warn some presumptuous bandit of the futility of any attempt to violate his person, had thrust a long knife down each boot, while from his hip protruded a .44-caliber horsepistol. Thus arrayed full panoplied for war, a lesson in preparedness, he sat upon the veranda of the hotel for three days without so much as setting foot upon terra firma, and departed silently in the night of the third day. For some time I wondered at the name of "Montgomery Ward Cowboys" given to such men by the plainsmen and mountaineers of the localities most visited. Upon a recent trip to Chicago I saw in a show window just such a costume draped upon a waxen image, with a note beneath apprising all observers of the fact that such was the only costume that could be fittingly worn west of the Continental Divide.

Despite my frequent visits in the Southwest and many friends of long standing who are engaged in various occupations in the arid lands, I have never been quite able to determine just where they leave off telling the truth about their country, and begin what they please to term stringing the tenderfoot. As a result, I am inclined to be incredulous regarding the various tales of wild animals, horrible accidents and hairbreadth escapes which the guides delight in repeating. For instance, I have it upon the authority of no less a person than Peter B. Kyne that the "hydrophoby skunk" which Irvin Cobb jokes about is a living, odiferous reality. He tells me that there is no doubt that there is a species of skunk infesting the vicinity of the canyon whose bite is hydrophobic. How this can be proven is a mystery to me, for I should be inclined to consider that any person who was fool enough to let a skunk get sufficiently close to bite was possessed of an insanity worse than hydrophobia before that animal entered the arena. I am also informed upon the same authority that the tales of wild asses in the canyon are not myths. On the contrary, one may at times get close enough to them to distinguish between those that live on the north and those that inhabit the south side of the canyon. Perhaps one can determine on which side of the canyon an ass lives by the difference between the lengths of the legs on either side, for I am also told that a wild ass always heads upstream. This naturally would wear the legs on the right side of the inhabitant of the south bank of the canyon shorter than the others, while the reverse would be true for those on the north bank. Be that as it may, there is little doubt that many animals have been frightened out of all

semblance of control by the hords of strangely costumed tourists who visit the district, and choose to cast their lot with the hydrophobia skunk rather than to suffer longer the burden of tourist weight on the repeated trips down the trail.



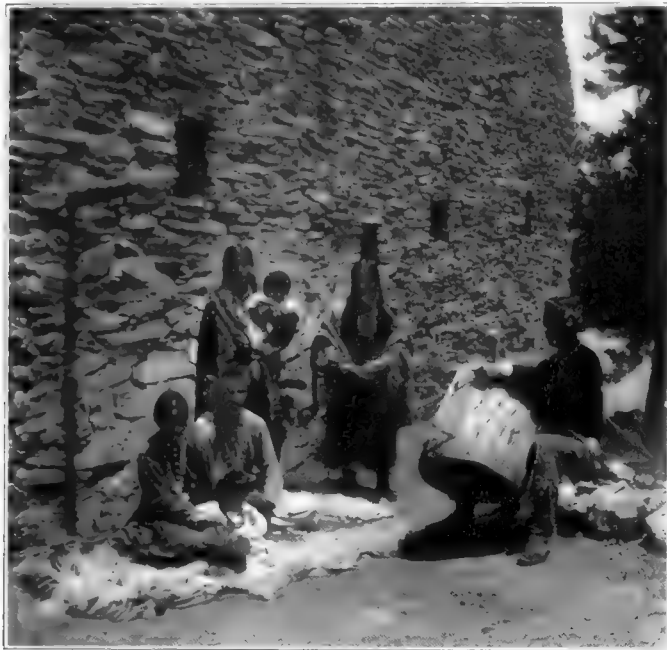
IN TUSAYAN FOREST

Along this road and through this forest the visitor is taken to Grand View which, in greater measure than might be expected after seeing other so-called grand views, justifies its name.

The guides are peculiarly adept in fastening a new story upon the first thing at hand, and already new ones are being woven around the recently erected monument to Major John Wesley Powell which has just been completed upon a point of the rim, the designing of which finally fell to the unfortunate writer's lot. Many plans had been submitted, all of which were most excellent in themselves, but, in the opinion of the judges, not exactly appropriate. To ask one what would be an appropriate monument for the Grand Canyon is almost comparable to asking what would be a fitting statue for heaven. In the opinion of many, a mere pile of stones with a tablet might have been best, but there was the appropriation which Congress made way back in 1909, the bronze tablet to Major Powell already cast, and something had to be done for the money. The monument, as built, is patterned after the design of an old Indian sacrificial altar, which consists of a pyramid forming a raised platform, on which the altar proper was placed to receive the bloody sacrifice. The monument is as like a pile of stones as any structure could reasonably be, and is perhaps as inconspicuous as might be desired.

Not long ago, shortly after the monument was finished, a tourist asked her guide what the structure was. He told her that it was on the spot where the last of the Aztecs, a nomadic group since lost, had sacrificed an American officer to their gods. She seemed to sense a certain tendency toward anachronism. When she read the tablet she cried, "Why, this is to Major John Wesley Powell, who discovered the canyon." Unabashed, he replied, "Sure, he discovered the canyon. That's why they killed him."

Perhaps it is not right to write of the Grand Canyon in a light or bantering way, but then, what is one to do? No words can describe it. To one who has seen it any



HOPI INDIANS READY FOR A DANCE

Every night in the Hopi House close to the El Tovar Hotel the Indians give their folk dances for the visitors and are the chief attraction of the place when the night comes and the Canyon is robed in darkness.

attempt at description seems puerile, while to those who have not visited the place serious attempts sound ridiculous. It is a place that defies superlatives. It is the most amazing spectacle on earth. Go and see it, and then listen to yourself as you describe it to your friends.

\$10,000 FOR FORESTRY WORK

THE Virginia legislature has appropriated \$10,000 a year for the operation of the State Forestry Department under the operation of State Forester R. C. Jones. This is the first appropriation ever made by Virginia for forestry work.

SAMPLE COPIES OF AMERICAN FORESTRY

MEMBERS of the American Forestry Association having friends interested in trees, woodlands and forests are urged to send their names to the association, and a sample copy of the magazine, AMERICAN FORESTRY, will be sent to them with the compliments of the member.

A TREE WITHIN A TREE

HERE is a tree growing within a tree. The burned-out old stump of a goosequill redwood (*Sequoia sempervirens*) is serving the excellent purpose of protecting its youthful successor from the winds. The stump and the young tree are on the property of the Glen Blair Lumber Company in Medocino County, California. While such a condition is not uncommon, it



Photograph by S. M. Bunnell, Pasadena, Cal.

GROWING WITHIN ANOTHER TREE

A young sequoia in Mendocino County, California, which selected an unusual place to grow and is making headway because it is so well sheltered from the winds.

is not often found so located that it can be readily photographed. The young tree within the stump, like others at the sides and back of the stump, is a shoot from the roots of the tree which formerly stood there. The original was about 11 feet in diameter and had been broken off in some storm and later burned.

The Bird Department

By A. A. ALLEN, PH.D.

Assistant Professor of Ornithology, Cornell University

PLANTING TO ATTRACT BIRDS

EACH year in the United States it is becoming more and more evident that urgent measures are necessary if we would preserve and increase the remnant of our native birds. While the change of conditions concomitant with the clearing of the land and the development of agriculture has undoubtedly aided the increase of a few species like the robin and house sparrow, the great majority of birds have decreased very rapidly. The robin and house sparrow have thriven because their food supply has become more plentiful and they require no more shelter than is afforded by the habitations of man and the few shade trees that he may plant about his dwelling. But most birds require more than this. The clearing of the forest and the woodlot, the mania for cutting down hedgerows and cleaning up all waste land has left the warblers, vireos, thrushes, flycatchers and many others with no place to retreat, no place to raise their kind.

It is true that great unbroken stretches of forest are remarkably poor in bird life, but the real deserts exist in the extensive grain fields and the city parks. Between the forest and the grain field, however, there is a mean which is most favorable to bird life, which admits of extensive and intensive agriculture, of cities and their parks, yet includes abundant provision for birds. This is realized in few places today. The problem is one for the forester as well as for the farmer and for the state.

More and more we are coming to realize that it is not sufficient merely to forbid the shooting of birds to promote their increase. We must provide a natural food supply and a place for them to nest. In the last number of *AMERICAN FORESTRY* we discussed the problem of the decrease of hole-nesting birds with the growth of modern forestry and the necessity for supplying nesting boxes to replace the natural nesting sites which are fast disappearing. The same argument obtains for birds nesting in thickets or cover of any kind. If the country is cleared and no consideration given to the needs of the birds, we must expect a great falling off in their numbers until we have made provision for them. Nor is it sufficient merely to set aside pieces of waste land, call them sanctuaries, letting nature take its course and expect these areas soon to supply the whole surrounding country with birds. The sanctuary is a long step in the right direction, be it established by the Government, the community, or the individual, and will probably do more than any other one thing to reestablish our vanishing birds and game. But just as the forest requires care in order to yield profits, so the sanctuary requires an ex-

penditure of thought and labor to yield birds. The ordinary city parks are sanctuaries in so far as shooting is prohibited, yet they are usually poorer in bird life than the woodlot, teeming with bird enemies and echoing with the shots of hunters and boys. The reason is not difficult to find. Most parks have been laid out with no



A WINTER TABLE CLOTH

Horned larks feeding on the snow. Many horned larks are permanent residents in the northern United States, although a distinct migration occurs during February—the lark being the first of the migrant birds to arrive in the northern States.

thought as to the requirements of birds; they are lacking in some essential. And so will be our sanctuaries, our reservations, our estates, our farms, our back yards, unless we stop to investigate the needs of birds and seek to meet them. This can be accomplished by the planting and suitable arrangement of trees, bushes and vines which supply the best food and the largest number of nesting places.

PLANTING TO SUPPLY FOOD

Let us first consider how we may increase the natural food supply. We will omit from consideration at this time the planting of such annuals as millet, sunflowers, buckwheat and kaffir corn which, while of great importance about the farm, sanctuary or game reservation, have no direct bearing on the problems of forestry. There are, however, many hardy shrubs and trees known to bear fruit attractive to birds which may well be included in a general scheme for planting in a sanctuary or in general reforestation.

The number of birds which depend upon fruits for

their sustenance during part of the year, at least, is surprisingly large and includes birds of almost every type from the woodpeckers to the thrushes, even the warblers, vireos and flycatchers being fond of some varieties.

In planting to supply fruit an effort should be made



NEST OF THE HORNED LARK

This nest was overtaken by a snowstorm during early April. The horned lark is the first of the smaller native birds to nest, often beginning to build as early as the middle of March so that frequently the birds are snowed in while incubating.

to select trees and shrubs with different fruiting periods, so that the supply will be more or less continuous. If nothing but mulberry trees were planted, for example, the birds would have a surfeit during June, July and August, but would starve during September and October. If wild black or bird cherries are added, the birds will be provided for until November. The Virginia creeper and wild grape will hold their fruit through the entire winter, and the hackberry, sumacs and barberry practically throughout the year. These last mentioned, while not so attractive, in the fall, when other fruits are available, are often the means of saving birds during the storms of early spring.

Mr. W. L. McAtee, of the Biological Survey, at Washington, has prepared a list of fruit-bearing shrubs and trees attractive to birds, in which he gives the fruiting season of each species.

Anyone considering the planting of fruits for birds should consult this list in Farmers' Bulletin No. 621. Most of these bushes and trees lend themselves to ornamental planting quite as satisfactorily as the more popular shade trees and could be used to great advantage about private grounds as well as in forests and sanctuaries.

Another strong argument in favor of planting the wild fruits is that of protecting the cultivated varieties. In some places the robins and waxwings do much damage to cherries, the catbirds and thrushes to berries, and the warblers to grapes, but in every case it is because there

are no native fruits in the neighborhood to supply their need. It is well known that birds prefer the native to the cultivated varieties wherever they are allowed a choice. If one is planning to grow berries where there are birds, he should see to it that there are wild berries somewhere in the vicinity; if he is to grow cherries, he should plant mulberries, June berries, wild cherries, honeysuckle or red-berried elders about his orchard. If the birds bother the apples or pears, there are always the Asiatic service tree, the crab apples and thorn apples that can be offered to them in part payment for the services which they have rendered at all seasons of the year.

The second problem in a bird's life is that of shelter. Although an abundant supply of food will usually serve to detain birds, they will not remain to nest unless abundant and attractive shelter for raising their young is offered. Broadly speaking, birds prefer bushes and trees having a thick or scrubby method of growth in which to conceal their nests. They likewise show a preference for those which are easy of access to their feeding grounds. In nature, the best feeding grounds are about the edges of forests, in clearings or along streams. Nine-tenths of the birds of a region are found nesting in such places while the center of the woods is almost devoid of bird life. On a smaller scale the same holds true of the woodlot and the thicket, nests are arranged chiefly around the edges. In fact, we might say that the amount of available nesting ground varies directly with the *circumference* of the woodlots or thickets rather than with their area. A large number



WINTER FOOD FOR ROBINS

Robins feeding on the berries of the Virginia creeper. These berries remain on the vine all winter or until consumed and are relished by all kinds of birds from the vireos to the woodpeckers.

of small thickets or woods, each surrounded by a little open country, therefore, would shelter many more birds than the same area of woods or thicket all in one piece. A few species require extensive growth of forest all

about them as though to insure safety, but the majority are more dependent upon the clearings. Ideal conditions for the nesting of the largest number of birds on a given area would be obtained by covering it with small groups of the proper kind of bushes and trees, each group surrounded by a little open space. This presupposes, of course, that there is likewise a sufficient supply of food and water. The customary ideas of landscaping held today with scattered groups of bushes and trees are favorable to bird life, especially when consideration is given to the species planted or to the method of clearing. In the forests the cutting of fire trails and small clearings tends to increase rather than decrease the bird life for the same reason. This general arrangement of the planting is as important as the actual selection of the species.

It is often possible to select for planting trees and shrubs that furnish available fruit as well as nesting sites. When the tree combines aesthetic and practical values, as well, it is highly desirable. Such are the red cedar and Irish junipers among the evergreens, the elms, the hawthorns, the wild rose and Virginia creeper.

Below is appended a list of woody plants suitable for attracting birds. Those unmarked bear fruit relished



A FAVORITE LUNCH COUNTER

Cedar waxwings feeding on the berries of the mountain ash. A flock will remain about one tree for days or weeks at a time until every berry is consumed.

FRUIT-BEARING TREES AND SHRUBS ATTRACTIVE TO BIRDS

- *Five-leaved Ivy, or Virginia Creeper. Aug.-Feb.
- Boston Ivy. Sept.-Mar.
- Red and Black Chokeberries. July-June.
- *Spicebush. July-Nov.
- *Japanese Barberry.
- (The berries are not often eaten when other fruits are abundant, but the shrubs furnish good nesting sites.)
- *Common Barberry. July-June.
- Black, or Cherry, Birch.
- Yellow Birch.
- Red Birch.
- (All the birches furnish food in fall and winter except the Red, or River, Birch, the fruit of which ripens from June to September.)
- White Birch.
- Hackberry. Jan.-Dec.
- *Dogwoods. June-Mar.
- White-flowering dogwood.
- (Very desirable for its ornamental value, both in flowers and in fruits, as well as for bird food.) Aug.-Jan.
- Cornelian Cherry.
- *American Hawthorns. Oct.-April.
- *English Hawthorn. Aug.-March.
- Weigela, or Diervilla.
- (The seeds are freely eaten in winter by slate-colored juncos, tree sparrows, redpolls, and pine siskins.)
- Oleaster, or Wild Olive. Sept.-April.
- Gumi.
- Japanese Oleaster.
- (As soon as the fruit ripens in July it is attacked by robins, catbirds, and cedar waxwings, and the tree is soon stripped.)
- Spindle Tree.
- (Fruits are eaten by the myrtle warbler.)
- Wintergreen. Jan.-Dec.
- Black Huckleberry. July-Oct.
- Shrubby St.-John's-wort.
- (In winter slate-colored juncos, tree sparrows, and redpolls are always found feeding on the minute seeds of this plant.)
- *Common Juniper. Jan.-Dec.
- *Irish Juniper.
- *Red Cedar.
- (A favorite food of cedar waxwings and myrtle warblers.) Jan.-Dec.
- American and European Larches.
- *Common Privet. July-April.
- *Bush Honeysuckles.
- *Japanese Honeysuckle.
- *Morrow's Honeysuckle. (Very attractive to birds.)
- *Ruprecht's Honeysuckle.
- *Grapes. Aug.-June.
- *Tartarian Honeysuckle. July-April.
- *Matrimony Vines.
- Partridge Berry. Jan.-Dec.
- Mulberries.
- (One of the best bird foods.) May-August.
- *Bayberry, or Candle-berry.
- (The best food to attract and hold the myrtle warblers.) July-June.
- Sour Gum, or Tupelo. July-Oct.
- White, Black, and Japanese Spruces.
- Austrian Pine.
- Red Pine.
- White Pine.
- (All the Pines attract crossbills and grosbeaks.)
- Mahaleb Cherry.
- (The best of the wild-cherry bird foods.) June-July.
- European Bird Cherry.
- Wild Red, or Bird, Cherry. June-Nov.
- Sand Cherry. June-Aug.
- Wild Black Cherry. July-Nov.
- *Flowering Crab.
- (The best winter food for cedar waxwings, robins, northern flickers, pheasants, and pine and evening grosbeaks.) Sept.-June.
- *Buckthorn. Aug.-April.
- Fragrant Sumac. Jan.-Dec.
- Shining Sumac. Jan.-Dec.
- Smooth Sumac. Jan.-Dec.
- Staghorn Sumac. Jan.-Dec.
- *Blackberries and Raspberries. June-Oct.
- *Black Elderberry. July-Oct.
- Red Elderberry. June-Aug.
- Sassafras. July-Oct.
- Buffalo Berry. June-Oct.
- *Greenbrier. Aug.-June.
- Nightshade, or Bittersweet. July-April.
- Mountain Ash.
- (As the bright red berries hang on the trees, about Christmas time, these trees add to a winter landscape by their ornamental appearance. They also furnish very good bird food.) July-April.

by birds; those bearing an asterisk furnish also satisfactory nesting sites. To this list, prepared by R. E. Horsey and Wm. L. G. Edson, of Rochester, N. Y., have been added the fruiting seasons as given by Mr. McAtee.

Many trees and shrubs not included in the list can be made to serve as nesting sites by the proper sort of pruning. Cutting back such trees as poplars so that whorls of branches are formed, or tying together the branches of such shrubs as the dogwoods increases the number of available nesting sites and has the desired effect.



A STAPLE WINTER DIET

A gold finch attracted by sunflowers. Many birds are fond of these seeds, especially in winter, and many should be planted just for the birds.

The list is not considered complete, but even a superficial inspection of it will show how one may very easily select a wide range of shrubs and trees suitable for almost every kind of planting which will at the same time attract birds by their fruits and by the shelter which they afford. Care should be used to select none which would serve to spread fungus diseases, even though they may be very attractive to birds. The various species of currants and gooseberries (*Ribes*), for example, which are often highly recommended as supplying bird food, have been omitted from the list because they assist in spreading the dreaded pine blister. In wheat-raising districts, the barberry should be avoided likewise, because it harbors the intermediate stage of the wheat rust.

BIRD LIFE IN APRIL.

"April showers bring May flowers" is a saying of our grandmothers, meaning that while April, itself, is rather unattractive it is a month of promise. And also in the realm of birds, it is scarcely more than a month of

promise. The first of the month continues the wave of migration that characterized the end of March and the end announces what is going to happen after the first of May, while the whole middle of the month is rather uneventful. The migrants reaching the northern States during the first week are still those that have wintered in the Gulf States and it is not until nearly the last of April that the barn swallows, spotted sandpipers and chimney swifts herald the return of wanderers from Central and South America.

It does not seem like a month conducive to the starting of homes and the assumption of family cares. Nevertheless many birds seem unable to await the more temperate May and some begin to build even before the snow has entirely disappeared. Some are those that have been with us all winter, like the chickadees, nuthatches, and woodpeckers; others are the early migrants from the South like the robin, the bluebird and the mourning dove. The horned larks begin to nest soon after the middle of March and many are the nests overtaken by the snows of early April. We should expect that the hawks and owls would begin nesting as early as this because their food of mice and birds is ever present, and most of them are far advanced in incubation before the end of the month. One species, however, the sharp-shinned hawk, always waits until after the middle of May before starting to build. A similar paradox occurs with the goldfinches and cedar waxwings, which, while with us all winter, do not breed early like the other permanent residents, but wait until June or even July.

Another strange case is that of the phoebe, which, although one of the flycatchers and dependent on insect food, returns to the northern States shortly after the middle of March and sometimes begins nesting before the end of the month while insects are still extremely scarce. They are hardy birds, these April nesters, and many of them raise two or even three broods during the season.

GUARDING WHITE PINES

IN order to safeguard the enormously valuable Western white pine forests from the white pine blister rust now known to have foothold in six Eastern States, and perhaps also in the Ohio Valley, and, second, to avoid the necessity of a burdensome quarantine, the Federal Horticultural Board has requested all Eastern nurserymen not to ship white pines, currants or gooseberries west of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma and Texas.

The white pine blister rust is a very destructive disease of all white pines, but occurs also in a different form, as a leaf disease, on currants and gooseberries, and may, therefore, be carried to new regions by any of these plants. Like citrus canker and chestnut blight, the white pine blister rust was brought to this country on imported nursery stock before the passage of the Federal Plant Quarantine Act. Ninety per cent of the infections now in North America came from a single German nursery. An attempt is being made to control the disease in the Eastern States. If this disease should spread to the

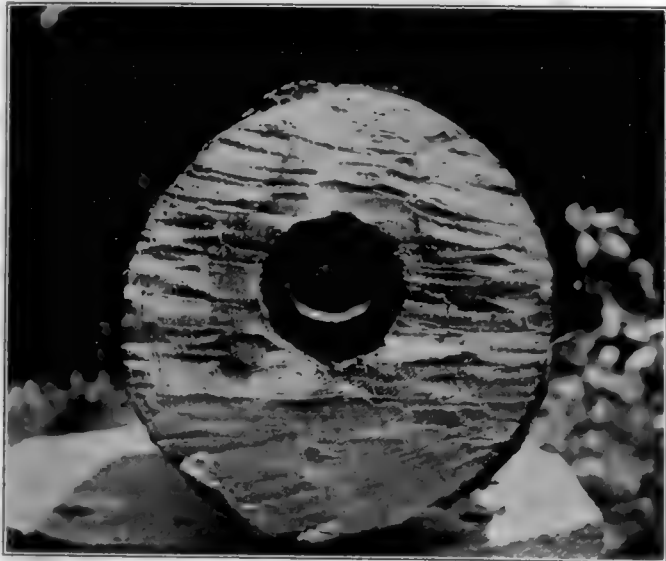
Rocky Mountains and beyond, the Western forests of white pines, which are now among our most valuable trees, will be endangered. At a very conservative estimate, the government and private holdings in these forests represent a valuation of \$240,000,000.

Compliance with this request on the part of nurserymen may make it unnecessary for the Department of Agriculture to declare a quarantine covering the known infested States, prohibiting the further interstate movement of white pine, currants and gooseberries. With the cooperation of the nurserymen, as proposed, very little, if any, hardship will be experienced, and the protection which a quarantine would give will be secured without restriction on the general nursery trade in the Eastern half of the United States.

The States within the range of the Western white pines will be warned of the danger from Eastern nursery stock, of white pines, currants and gooseberries, and the inspectors of all of the Western States will be asked to notify this board of the shipment into their several States of any of the stock referred to from points east of the western line of the States enumerated. If, as a result of this request, no such shipments are made, further action may be unnecessary. If, however, nurserymen should ignore this request, it is practically certain that a quarantine will have to be established at an early date prohibiting the interstate movement of these plants from the infested States.

WOODEN PIPE A CENTURY IN THE GROUND

SOME exceedingly interesting specimens of wood that have stood the test of time have come to light in Philadelphia recently in the work of relocating sewers in preparation for the new subway system. At the southwest corner of Washington Square, a section of wooden pipe in excellent condition was chopped out where it crossed a trench that was being dug. It was



A CENTURY IN THE GROUND

This piece of pitch pine was used in Philadelphia as a water pipe. It has a 4-inch bore and the log was about 14 inches in diameter when taken up. It had been in the ground over a hundred years.

about four feet from the surface of the ground to the center of the pipe. The wood was positively identified as *Pinus rigida*, or pitch pine. This tree grew to good proportions about here in the early days.

From 1790 to 1795, Philadelphia was scourged several times with epidemics of yellow fever, and the water supply was blamed. A "Watering Committee" accepted the plan of Benjamin Henry Latrobe; the entire system was of wooden pipes, as no others were known then. The total of wooden pipe in use by the city at any one time seems to have been forty-five and a half miles, and it was not until 1817 that the first cast-iron pipe was used. The specimens now being taken out were in the plans of the first system and were undoubtedly laid in the years 1799 to 1801. While the color has been changed slightly clear through the log, and the odor has been affected, the wood still retains a resinous aroma and is firm in texture. The logs used were of a size suitable to the size of bore, which varied from 3 to 6 inches. The specimen photographed had a 4-inch bore and the log was about 14 inches in diameter when taken up.

Wood was practically the whole thing in this first water-works system, even the boilers and much of the pumping engines having been of that material.

WILL PLANT NUT TREES

THE Board of Estimates of Baltimore has approved the city forester's plan for the planting of fifteen nut trees this spring. City Forester Maxwell expects to use these trees on one of the city reservations where conditions of growth are good and if the experiment proves successful to extend the use of nut trees to other city planting. He is trying to initiate the European idea of getting something more than shade service from trees that are planted. He will use either English walnuts or pecans in the planting.

IDENTIFICATION OF WOODS

OVER 1,000 samples of wood are annually submitted to the United States Forest Products Laboratory, Madison, Wis., for identification. The requests vary in importance from one case in which a party wished to know from what kind of wood a particular chess pawn was made to that of a contractor who had thousands of ties rejected by a railroad on the ground that they were red oak instead of white oak as specified. As a rule experienced lumbermen can readily distinguish between species commonly handled, but when a particular specimen shows some abnormal growth or discoloration they are in doubt. At the Forest Products Laboratory samples are usually examined under the microscope which makes visible many characteristics not visible to the unaided eye. The distinguishing characteristics of over 400 native and 100 foreign woods have been studied and arranged in systematic order for use in identifying samples submitted.

The Man Who Loved the Birds

John James Audubon, whose birth is commemorated by Bird Day, May Fourth

BY SAMUEL B. DETWILER

TUESDAY, May 4, is official Bird Day, and the 136th anniversary of the birth of John James Audubon. Dime-novel fiction can produce no more fascinating tale than the life story of this man, whose love for birds was so great that the song of the wood thrush moved him to prayer. Passionately devoted to art and science, filled with boundless energy, he endured privation and overcame difficulties that few men would have had the power or courage to encounter. Aside from the wonderful work, "The Birds of America," that remains to perpetuate his fame, the nobility of his life places Audubon among the eminent men of our country.

Philadelphians have an especial interest in the life-story of this distinguished naturalist, since it was at his early home near this city that he first conceived and partly executed his great work. Twenty miles from Philadelphia, at the point where the Perkiomen unites with the Schuylkill and in close proximity to the historic hills of Valley Forge, lies Mill Grove Farm, which to Audubon was always "a blessed spot." It was here he spent the carefree days of his young manhood, a paragon of manly beauty, grace and accomplishment.

Mill Grove is today as beautiful and peaceful as in Audubon's time, and, as maintained by its present owner, it is an interesting memorial to the man to whom Bird Day is dedicated. Nestling among the woods that Audubon loved, on a sloping terrace overlooking the old mill and the peaceful farm lands across the beautiful Perkiomen, it is still a haven of rest and quiet. Not far distant is Fatland Ford farm, and the mansion where he first met Lucy Green Bakewell, who afterward became Audubon's devoted wife, and through her self-sacrifice enabled him to win success. Further on is the village of Audubon, which was renamed in his honor.

Within sight of the village, on the hills that line the south side of the Perkiomen Valley, are the ruins of the old lead mine, once the property of Admiral Audubon, the father of John James Audubon. It is reported that these mines furnished lead for many of the bullets used by the American army in the Revolutionary war. A path leads from the mines to Mill Grove, along the steep,

forested hillside, and in this sylvan retreat the naturalist spent many of the happiest days of his life in studying the birds with which the locality still abounds, and making his drawings and paintings. Audubon has told of his immeasurable joy over the discovery of a method of using wires to mount the subjects of his drawings in attitudes true to life. This discovery was important since it was his ambition to make his paintings accurate not only in color but to portray the characteristic haunts and habits of the birds. A small natural cave formerly extended into the steep, wooded slope not far above the old mill, and here Audubon lived with the birds, learning their ways and painting them in their natural surroundings. He records that it was in this



Photo by J. Howard Fell

MILL GROVE

It was here, twenty miles from Philadelphia, where the Schuylkill and the Perkiomen unite that John James Audubon spent his young manhood.

grotto that his bride-to-be first confessed her love for him.

The house at Mill Grove was built in 1762 by James Morgan, of Philadelphia. In 1778 it was purchased by Admiral Audubon after a visit to Lafayette at Valley Forge. The old sailor built an addition to the house and took great pride in laying out the grounds. Since 1813 the estate has been in the possession of the Wetherill family. The present owner, Mr. W. H. Wetherill, has his summer home here, and takes pride in preserving many interesting mementos of the great bird lover.

Fatland Ford farm lies on the more elevated land immediately south of Mill Grove. The mansion was built in 1760 by James Vaux, and in 1804 was purchased by William Bakewell, a descendant of the Peverils, made

famous in Scott's novel, "Peveril of the Peak." This estate also has for many years been the property of the Wetherills. The stately mansion stands in a commanding position, affording a magnificent view of Valley



Photo by J. Howard Fell

THE OLD GRIST MILL

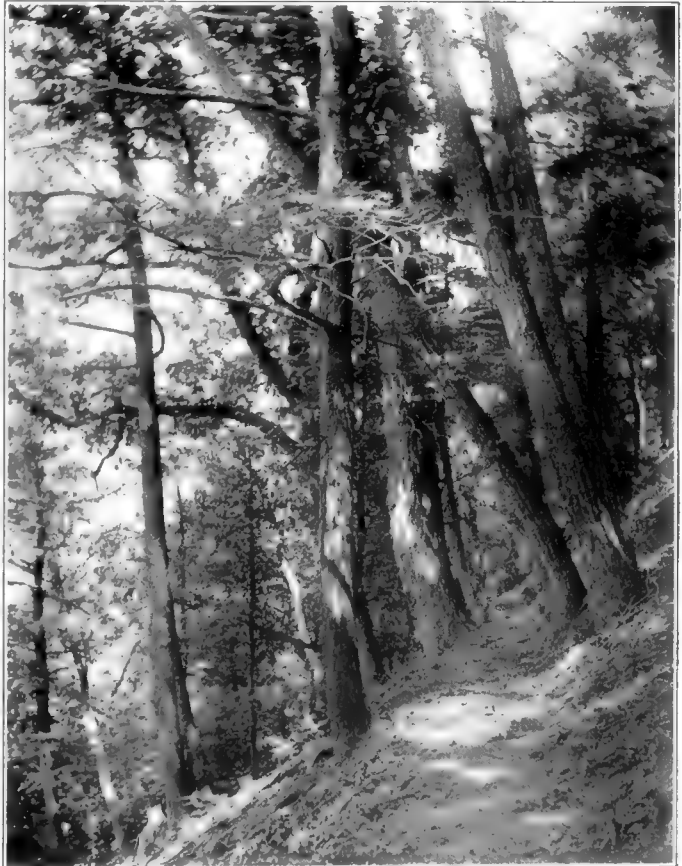
This ancient stone structure was built at Mill Grove before Audubon lived there.

Forge and the Schuylkill Valley. One end of Sullivan's bridge was not far from the house. General Washington spent a night in this mansion when moving his battered army to Valley Forge, and twelve hours later the British army arrived and General Howe lodged there. The quaint old walled rose garden, the big stone barn, and the old "spring-house"—the first dwelling house in this locality—are in use today, in a fine state of preservation, monuments to the art of the early builders.

Audubon's father was one of a family of twenty children. At the age of twelve he was provided with a shirt, a suit of clothing, a cane and his father's blessing and sent into the world to find his fortune—which he promptly did. He became a sailor, commanding a vessel at twenty-one, owning one at twenty-five, and in ten years more realizing a comfortable fortune. He purchased an estate in St. Domingo, and later, in Louisiana, he met and married Anne Moyette. Three sons and a daughter were born to them, John James, the youngest boy, being born May 4, 1780, in New Orleans. A few years later, Madame Audubon was cruelly murdered during a revolution of the negroes in St. Domingo. The elder Audubon returned to France, where he became an admiral in the navy, and the future naturalist was brought up by a loving and over-indulgent stepmother. From his earliest years his love of nature was highly developed, and this led him to neglect studies for the investigation of the wonders of woods and fields. At this point his father mapped out a course of study, and insisted that he attend diligently to his education, but this program was seriously disturbed by the turmoil of the French revolution. His studies included mathematics, geography, drawing, music, fencing and dancing.

At Nantes, under the instruction of the great drawing master, David, he first began to make drawings of birds, and completed 200 sketches.

His father was anxious for him to win military honors, but this did not appeal to the young man, so he was sent to America to care for his father's property. Yellow fever was raging in New York when he landed, and he was immediately stricken, but was taken to Morrisville, N. J., by friends and his life saved by careful nursing. On his recovery, he proceeded to Mill Grove and found it a delightful place, entirely suited to his romantic nature. After a time his happiness was marred by the arrival of his father's agent sent to superintend the lead mines, who presumed to dictate to the young genius, but who encouraged him to make the study of birds his life-work. The authority ventured by this great agent was resented by Audubon, and when objection was raised to his proposed marriage with Lucy Bakewell, and a plot disclosed to ship him to India, the spirited youth walked, in three days, in mid-winter, to New York, where he



Photographed by J. Howard Fell

HIGH PATH THROUGH WOODS FROM MILL GROVE TO COPPER MINE

This road, as in Audubon's time, is a place to delight the bird-lover and the nature student.

borrowed sufficient funds to carry him to France. The father supported the son's action and discharged the unscrupulous agent. However, the young nature student remained with his parents for a year, indulging his taste for hunting, fishing and collecting. At this time

Napoleon called for men for his campaign against Russia, and it was decided that John James should enlist in the navy rather than be drawn in a general levy. Later, he obtained leave of absence, and, in company with a young man named Rosier, sailed for America. They landed in New York after an adventurous passage, and went at once to Mill Grove, where they were mutually happy. One writer gives an interesting account of a visit to Audubon at Mill Grove during this time:

"On entering his room, I was astonished and delighted to find it was turned into a museum. The walls were festooned with all sorts of birds' eggs, carefully blown out and strung on a thread. The chimney-piece was covered with stuffed squirrels, racoons, and opossums; and the shelves around were likewise crowded with specimens, among which were fishes, frogs, snakes, lizards, and other reptiles. Besides these stuffed varieties, many paintings were arrayed upon the walls, chiefly of birds. He had great skill in stuffing and preserving animals of all sorts. He also had a trick of training dogs with great perfection, of which art his famous dog, Zephyr, was a wonderful example. He was an admirable marksman, an expert swimmer, a clever rider, possessed great activity, prodigious strength, and was notable for the elegance of his figure and the beauty of his features,

story of the destruction of a valuable painting by his favorite hunting dog. After finishing a painting of grouse, Audubon went out of the room, leaving his canine companion sleeping before the fire. Awakening suddenly, the dog was deceived by the life-like attitude



Photo by J. Howard Fell

RUINS OF THE ECTON MINE

This mine was developed from the mine originally owned by Admiral Audubon, and the ruins are now frequently visited by tourists.

of the birds and fell upon them, ruining the canvass. On his return Audubon mildly remarked, "Zephyr, you little know what mischief you have done," and proceeded to repaint the picture.

His love for Lucy Bakewell led Audubon to ask her father for her hand in marriage, but Mr. Bakewell advised him to first enter commercial life and establish a business. With his friend Rosier, he went to New York and entered a counting house, but quickly lost a considerable sum of money through speculation, and demonstrated his lack of business ability by devoting most of his time to the gratification of his natural tastes for the woods. He was given up as a hopeless case by his friends, and returned with Rosier, who was also unsuccessful, to the more congenial surroundings of Mill Grove. During the following two years they made several trips to Louisville, Kentucky, as partners in trading ventures, and then they decided to set up a permanent establishment there.

Mill Grove was sold, and on April 8, 1808, Audubon was married to Miss Bakewell, and started on his wedding journey to Louisville, arriving after an eventful trip in which his bride was nearly killed. He and his partner were soon settled in business, but while Rosier stayed behind the counter and took care of the trade, Audubon enjoyed the hunting and social life of the planters, with whom he quickly became a favorite. He continued his studies of the birds, and his plan for a "biography of the birds" took definite shape, but the



Photo by J. Howard Fell

RUINS OF OLD STAMPING MILL

All that remains of the stamping mill at the old Ecton Copper Mine. This mine is said to have supplied much of the lead for bullets used by the American army during the Revolutionary war and it later produced considerable quantities of copper.

and he aided nature by a careful attendance to his dress. Besides other accomplishments, he was musical, a good fencer, danced well, had some acquaintance with leger-demain tricks, and could plait willow baskets."

Audubon had a great fondness for animals of all kinds, especially dogs. His patience is illustrated by the

war of 1812 came on and diminished the revenues from their business. They moved to Hendersonville, and started a new enterprise, but this proved a failure. A removal of his business to St. Genevieve, on the Mississippi River, below St. Louis, was planned, and Audubon set off with his remaining goods loaded on a barge. The trip afforded him a fine opportunity to gratify his taste for the wilderness, for the country through which they passed was an almost unbroken stretch of magnificent hardwood forest, and they were delayed by many mishaps. Continued bad fortune followed them, and Audubon started to return to his wife and family at Hendersonville, traveling on foot. With this journey began a long series of stirring and strenuous experiences that make his biography read like a romance. Poverty and privation made his life sad, for it brought suffering to his brave wife, who in spite of all their troubles encouraged him to continue the great work on which he was well advanced. Often penniless and earning a scant living with his brush as a portrait painter, and in other ways, he went from place to place, sometimes taking his family with him, but more often wandering alone. Dressed in the rough leather shirt and leggings of the trapper, sometimes weeks and months in the primeval forests, subsisting on wild fruits and meats, often forced to beg his way, he faced danger and difficulty with unlimited enthusiasm. He was happiest in the woods, and his patience and perseverance in the conquest of science and art were boundless.

Years passed in this manner, then his wife conceived the idea of assisting her husband by teaching, and eventually to send him to Europe for the purpose of finishing his instruction in oil painting (his previous work having been done with pencil and crayons). From 1822 to 1826 they labored with this end in view, and in July, 1826, Audubon landed in Liverpool, exhibited his drawings in various cities, and opened a subscription for their publication. The following December this dream came true, 170 subscriptions to "The Birds of America" at \$1,000 each having been made. Not only was he thus put at financial ease, but great honors were accorded him by Cuvier, Humboldt, Sir Walter Scott, and other great men of the day.

Although he might well have retired to a life of comfort, he soon returned to the wilderness to continue his great work. He journeyed from Florida and Texas to Labrador, and from the Atlantic Coast to the Rocky Mountains. When over sixty years of age, after the completion of his work on birds, he began a similar work on animals, "The Quadrupeds of America," with undiminished enthusiasm. But before the completion of this volume his physical powers failed him, and on January 27, 1851, he died peacefully at his home near Tarrytown, New York. But his memory lives, for as one who loved him has said:

"While the little wren chirps about our homes, and the robin and reed-bird sing in the green meadows; while the melody of the mocking bird is heard in the cypress swamps, or the shrill scream of the eagle on the frozen shores of the northern seas, the name of John James

Audubon, the gifted artist, the ardent lover of Nature, and the admirable writer, will live in the hearts of his grateful countrymen."

RAILROAD SAVES THE TREES

THE Sharpville, Pa., station of the Baltimore & Ohio Railroad is being cited as evidence that some of the so-called "soulless corporations" are not so soulless after all. At Sharpville the railroad company purchased extra land for tracks and a station in order to allow two beautiful specimens of the silverleaf



RAILROAD SAVES MAPLE TREES

The unusual consideration shown by the B. & O. R. R., at Sharpville, Pa., in saving two fine maple trees.

maple tree to keep on growing on the right of way, although by chopping them down many hundreds of dollars would have been saved.

When the engineers ran their lines into town the plans called for the tracks to be laid over the ground now occupied by the trees. Then some of the officers of the company inspected the route and discovered the trees, and some lovers of trees made pleas for the preservation of the trees.

The pleas were heeded and the engineers had to run new lines and make plans for a curved track in order that the trees might stand undisturbed.

A similar condition cannot be found throughout the country, according to traveling men. It is not uncommon for strangers to stop and wonder at the sight of the trees growing between railroad tracks.

JANUARY, 1915, COPIES NEEDED

THE American Forestry Association will be glad to buy copies of AMERICAN FORESTRY for January, 1915, and members having copies of that month and not needing them will confer a favor on the Association by mailing them to the office at Washington, D. C.

Have you invited a friend to become a subscribing member?

THE CHILDREN'S DEPARTMENT

BY BRISTOW ADAMS

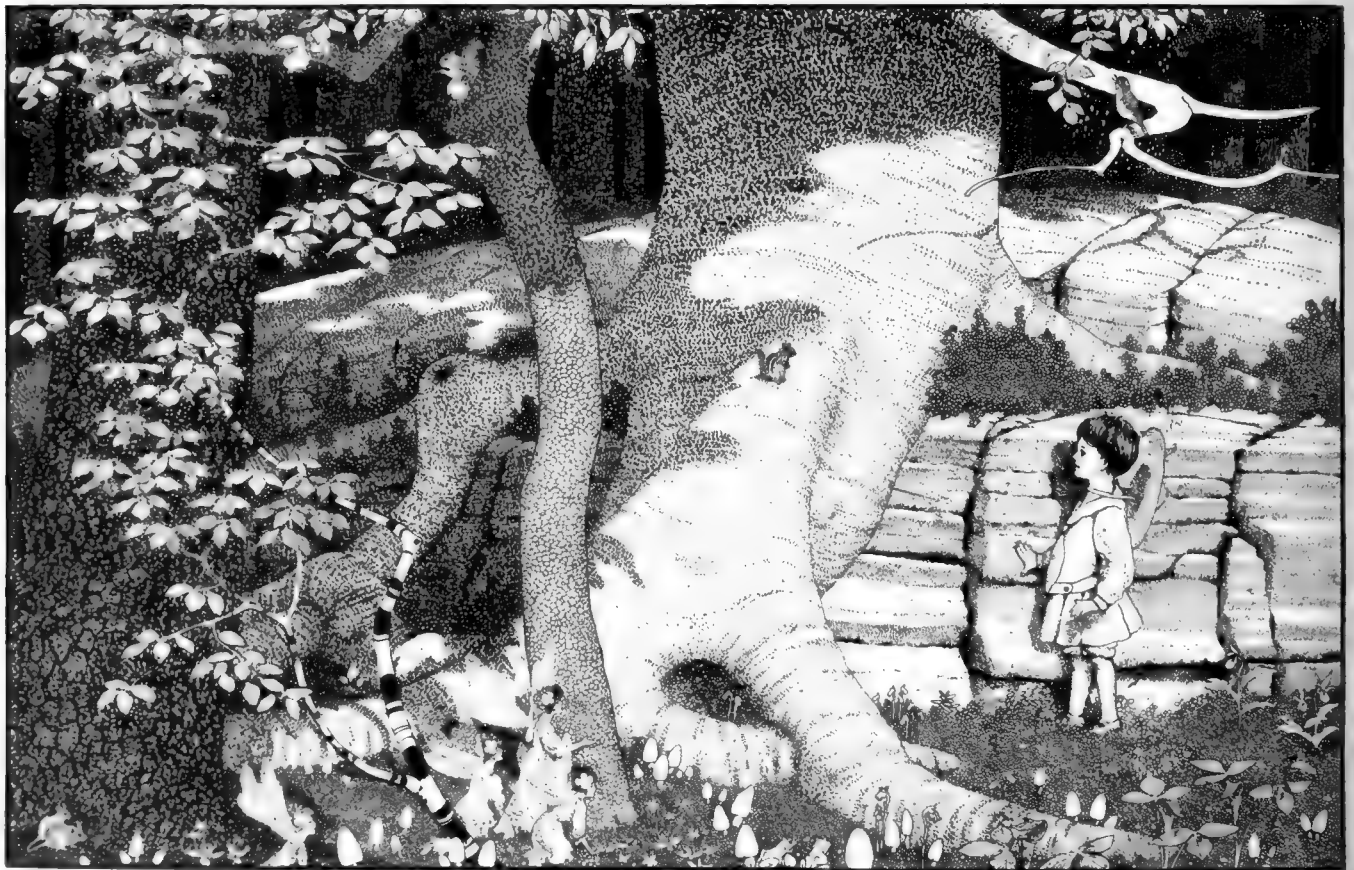
FAIRIES OF THE WOODS



ALONG with the maple, the lumbermen in the North woods cut beech and birch trees and the hemlocks, since all of these are likely to grow together and to be lumbered together. This forest, as we have seen, is one of great beauty, especially in the fall, and a large part of it is all of the same age and all of the same height. A man in an aeroplane flying over the tops of the woods, especially in the fall, would see a

pine mice and white-footed mice. On still nights the voices of the little creatures of the wood can be heard on all sides, from the great cry of the horned owl to the twitterings of the little birds half-awakened from sleep but still drowsy, and the tiny squeakings of young mice in the hollow logs.

FROM the ground to the very tips of the trees there is a succession of growths of mosses and lichens in colors of soft grey, and green, and lavender, and



Drawing by Walter Stone King

FAIRIES OF FACT—CAN YOU FIND THEM?

Besides the four fairies of romance there are eight tiny living creatures—fairies of fact—of the ground, the trees and the air in this picture. Can you find them all?

succession of plains, and hills, and valleys carpeted with the most wonderful colors, with here and there a few dark, tall pine trees with their heads sticking, like little islands, above the rest. Here and there will be deep holes in this layer of trees, and these would seem to be fringed with a darker green, where spruce, or arbor vitae, or tamarack grow around the edge of lake or swamp.

BETWEEN the ground itself and the topmost twigs—which are all that the aeroplane flyer would see, there is a rich and varied life. Many birds build their nests in these trees; squirrels have their homes; and in the ground beneath there will be frogs and chipmunks,

even a brilliant red. The granite rocks on the ground are spread over with these mosses so that their color blends with that of the trees. In the shadier places the waxy white Indian pipes grow in their season, the jack-in-the-pulpit, and the moccasin flower. Toadstools and mushroom growths vary in shape and color from masses like carved ivory, as delicate as coral, to tiny, round-headed "toadstools" of most startling red and orange.

When the woods are cut, many of these little fairy-like forms are likely to be torn up and destroyed—not only the homes of the birds and squirrels, but the homes of creatures so small that we cannot see them. Yet man needs the lumber to go into homes for men, and to be put to his use in many other ways.

HERE are two lumberjacks sawing away at the base of a giant maple. Up in the top of it a flying squirrel is in hiding. He has stayed there in the tree even after all of the other trees near at hand have been cut away. His little heart beats faster than ever with each thud of the ax into the tree, and with the vibrations of the saw which go through the wood fibres from the base to the highest leaves. Soon the tree begins to sway, and the squirrel knows that he is no longer safe there. He leaps clear of the branches with a long, slanting, downward shoot, using his aeroplane to reach the nearest tree in that part of the woods which is still uncut. It is a slender, yellow birch, and as he comes near it, his flight takes a sharp upward turn. By the time he nears its trunk, he is headed up the stem full-tilt, and so on up to a branch that goes off and gives him a passageway over to another tree. In fact, all the treetops are full of these well-known runways, and certain limbs get worn smooth with the passage of the feet of the squirrels—red squirrels, flying squirrels, and all—just as man's feet will wear a smooth pathway across the ground.

THE woodchoppers see the long air-dive; out of curiosity one of them takes the long stick with which he measures log-lengths and measures off on the ground the distance which the squirrel has flown. He finds that there are just five lengths of his light 16-foot pole between the stump of the maple tree, which has just been felled, and the base of the slender birch which marked the end of the squirrel's flight. He thinks that 80 feet is a long leap for one little squirrel to undertake. As for happenings of this sort and of even more exciting kinds—well, "the woods are full of them."

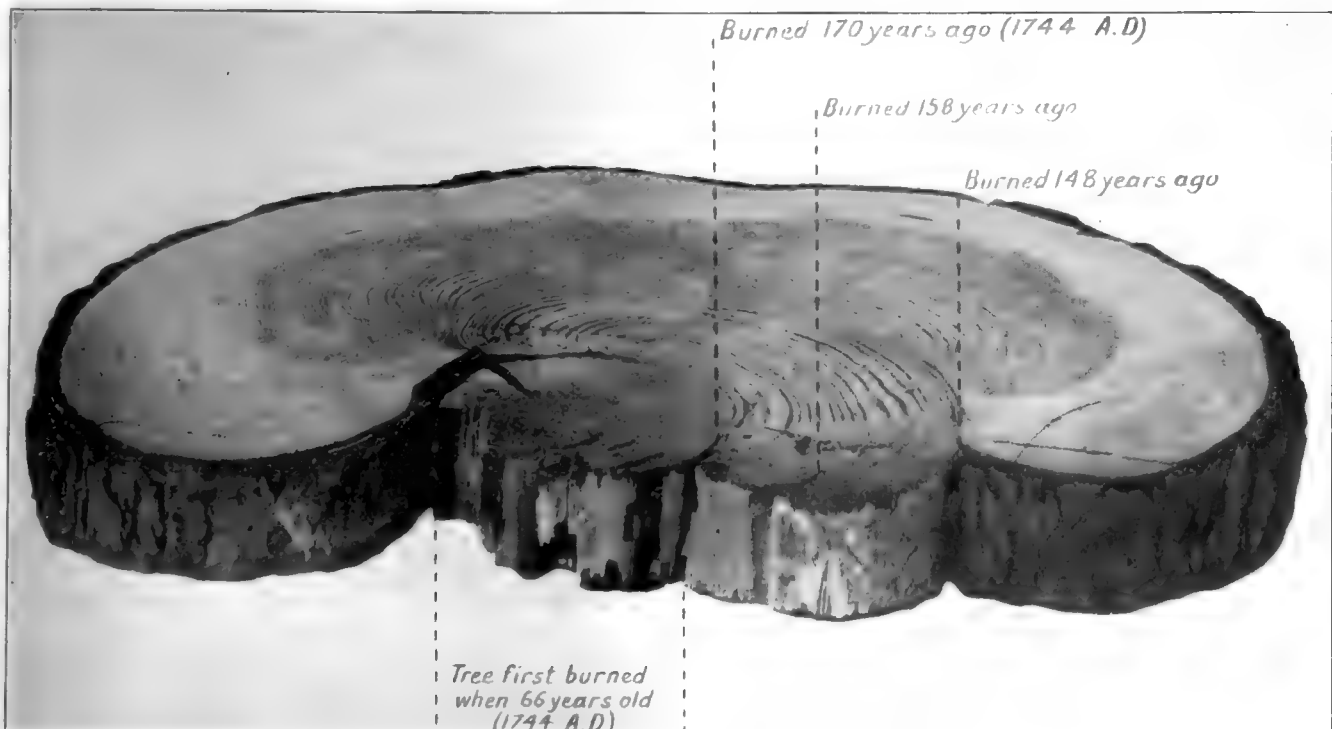
OFTENTIMES children, and sometimes even the grown-ups say that they are sorry that the age of fairies seems to be over, and yet there are more wonderful fairies of fact than the old romancers ever

dreamed of. Creatures tinier than any they could imagine are working day and night building things for man, and others, again, tearing them down. The birds themselves can be thought of as fairies with wings, working every moment for man's good, searching out the insects from the crevices in the trees and adding beauty in color and sound to man's life. The scientist has found more real fairies than all of those which have added to the lore of elf and goblin, gnome and sprite; and the scientists' fairies are more wonderful because they are tinier than was ever thought to be possible. Then, too, they have such changing and marvelous shapes. The old-time fairies were always thought of in terms that the folk-lore gatherers could understand—that is, they were in the general form of man, only much smaller. But the scientist finds that the new fairies do not have to be limited to any such forms.

SO DO not be downcast when any one tells you that there are no more fairies, but rather be glad that there are new and different ones—ones that you can study and find out about for yourself, and ones that you know are really alive today.

Ah, little lad, that seeks for fairy lore,
Think not that all is gone—that cold dry facts
Must do away with elves and sprites of yore
With all their witching ways and kindly acts.

Here in this time, if we will only learn
The ways of wood-folk in their work or play
We may be sure of fairyland's return
In living wonders of the present day.



SCARS OF FOUR FOREST FIRES ON THIS TREE

A section of a tree trunk showing how the dates of forest fires are ascertained from the remaining surviving trees in the fire-swept tract. Each fire which injures a tree leaves a permanent scar and the date when it occurred can be determined, or at least very closely, approximated by counting the number of annual rings between the scar and the outer circumference of the tree. This photograph and estimate were made by the Commission of Conservation of Canada.



SECTIONS OF TREES SHOWING HOW THE BEAVER DOES HIS CUTTING

The beaver is a true conservationist, because the trees that he cuts up to store away for a winter food supply are of only small or medium size, and are of a species that have little value to man. As a lumberman, he is admirable; for he prevents forest fires, he leaves no high stumps, and he manages his tract so that the next beaver colony finds more timber and better conditions than did the first one.

Protection of Beaver in Wisconsin

By F. B. MOODY

Of the State Conservation Commission of Wisconsin

THE beaver, one of the most wonderful creatures in the animal kingdom, who was the pioneer lumberman, engineer and architect on this continent, has entered upon a new industry. He is now trying to regulate and manage a railway in Wisconsin. An official of the Chicago, Milwaukee and St. Paul Railroad has had to apply to the State Conservation Commission for relief from an artificial lake that a colony of beaver has created upon the main tracks of the railroad between Harshaw and Goodnow by damming Bearskin Creek.

The beaver might even be considered a shrewd lawyer, for, although he is interfering with the passage of the United States mails and delaying interstate traffic, he seems to know that he is secure in his person from attack or arrest, just like a member of a legislature during a session, and he calmly proceeds, without the shadow of a franchise, to build and maintain a dam, and also to walk, loiter and be upon and along a sacred railroad right of way.

It is perfectly evident that the beaver will have to get into politics soon, and will probably need to be represented in the Wisconsin Legislature. It is not known just what his political affiliations will be. The railroad interests find it difficult to decide whether the beaver is more of an ultra-progressive or a standpatter. Although he works a good deal in the dark, some consider his

methods decidedly Rooseveltian; and, again, he seems to be a staunch upholder of the Wilson policy of preparedness.

Possibly the beaver knew that the United States Government reserved the flowage rights on many of the Government lands that were sold; or possibly they resented the fact that, although they were there first, the railroad corporation, without consulting the community at all or securing any authorization, laid its ties and rails right where the beavers' city planning commission had always intended to erect an elegant four-story swimming hole. At any rate, a great clashing of two public interests is imminent, and, so far, the hero of Cameron Dam has nothing on the beaver.

The wonderful knowledge and industry and perseverance of the beaver have won the enduring interest and admiration of man. As an engineer, he so wisely selects a narrowed place in a stream for his dam, a site with good banks. If the stream channel is very wide, he accepts the inevitable and curves his dam upstream against the current. Then the wonderful, patient labor of cutting his logs, getting them down stream and placing them, of swimming again and again, with his little load of mud or stone clasped to his body with forefeet, to chink in the dam. He is mason as well as engineer and builder, and even a landscape architect; for he

brushes in his dam with pieces of tree branches that often take root and grow, such as willow, birch and alder. In time these form a hedge or timbered ridge. Dams have been found that were a quarter of a mile long

so that the next beaver colony finds more timber and better conditions than did the first one.

He prevents fires by lopping tops and branches, thus destroying his own slash, and also by creating a lake that forms a barrier to fires and perhaps by cleaning out the timber along the canals that he digs, which extend up into timbered areas.

The beaver is a true conservationist. The trees that he takes and cuts up to store away for a winter food supply are of only small or medium size, and are the species that are of little value to man. Moreover, the broad lake above his dam is a great bowl that holds the soil washed in, and ultimately becomes a level, fertile tract, supporting a fine growth of timber. So the beaver takes only the poorer trees and near to the water. Wherever he cuts his timber he must first make a waterway by lake or canal, and wherever he makes his waterway he is laying the foundation for level, fertile valley and fine forest. In fact, it has been found that a large part of the fertile meadows and bottom lands east of the Mississippi are the result of his indefatigable industry.

And all of this work is merely incidental to his making a living. He builds the dam to make a lake, and thus secure a safe depth of water over the entrance to



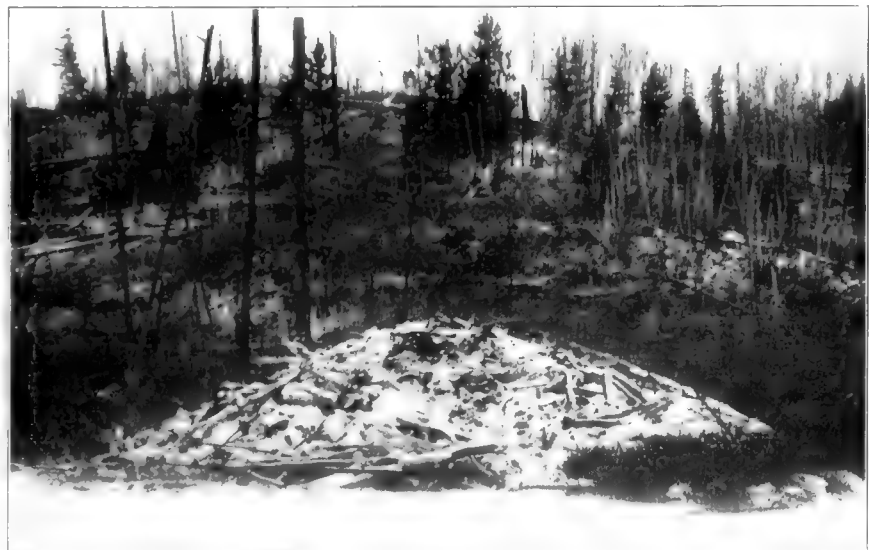
BEAVER DAM ON BEARSKIN CREEK, WISCONSIN

As an engineer, the beaver wisely selects a narrow place on the stream for his dam, a site with good banks. If the stream is very wide, he accepts the inevitable and curves his dam upstream against the current. Dams a quarter of a mile long and seven feet high have been found.

and seven feet high, and beaver canals have been excavated back into the woods to a distance of 200 feet and with a width of 3 feet and depth of from 18 inches to 2 feet.

Like the settler in the West, the beaver lives in a dug-out for the first year or two after he settles in the country; that is, he makes a burrow in the river bank. Then he fells his timber and builds a house, cutting his logs about 6 feet in length; and a wonderful house it is—a wigwam of logs and brush, cemented with mud just before freezing weather begins, so that it becomes impregnable to attack from other animals. Its entrance is through the floor and from the water. Each family of from four to eight beaver has its own house, and each individual its own bed in a dry place at one side of the room. In the center of the room the beaver eats his food, brought up from the water depths, carefully clearing away all refuse afterward.

As a lumberman he is admirable, for he prevents forest fires, he leaves no high stumps, and he manages his tract



A BEAVER HOUSE

This is made of logs about six feet in length and of brush cemented with mud just before freezing weather begins, so that it becomes impregnable to attack from other animals. Its entrance is through the floor and from the water.

his house. By means of the lake he transports the timber for his house and for his food, and in the lake, which must be deep so that there will be water below the ice in winter, he stores his winter supply of food, sections of trees from which he can strip and eat the bark.

Now and again the flowage from the beaver dams affects the land of some farmer or damages some enterprise, and as the beaver are protected animals under the State laws, relief can be had only by destroying their dams. This often gives only temporary relief, for the beaver hasten to rebuild or repair the dams, and it is really pathetic to see such monumental industry exercised for naught, as the dams are again destroyed.

The problem is to protect the few scattered individuals whose business undertakings are damaged by beaver and at the same time to preserve the few remaining colonies of this highly interesting animal, which once ranged the continent in large numbers from coast to coast.

It is certainly discouraging to a poor, hard-working beaver to have his rights as a squatter disregarded. The famous Husting waterpower act, which was said to have stopped waterpower development in Wisconsin, failed to block the development of beaver dams, but now that the State Conservation Commission may insist on fishways in beaver dams and the State Railroad Commission is likely to require boat hoists in new dams and to establish benchmarks to regulate the water levels, it looks as if the game wasn't going to be worth the candle for the poor beaver, to say nothing about his difficulties in getting an indeterminate franchise.

The State Conservation Commission of Wisconsin is investigating the best methods of catching and transporting beaver alive, with a view to removing them from localities where they are damaging private property to some selected area in the State. It is certain that the majority of the people want the beaver colonies preserved, even if a few farms have to be purchased to protect the animals in their activities.

In New York it was believed for a number of years prior to 1904 that beaver had been exterminated. However, there were perhaps twenty left in the lake region

south and west of St. Regis Mountain. In 1904 the Legislature appropriated \$500 for purchasing beaver to restock the Adirondacks. The next spring six beaver were secured from the Canadian exhibit at the Louisiana Purchase Exposition and were released on Moose River and Big Moose Lake. In 1906 fourteen more were procured from Yellowstone National Park. In all twenty-one beaver were released by the State and several by private citizens.

In 1910 sixty families of beaver were known to be scattered through the Adirondack region and were breeding rapidly. For the last three of four years reports show that the beaver are continuously increasing, and some reports of damage to private property have been coming in. In some instances it was found necessary to disturb the houses of the beaver so as to cause them to seek new quarters. In one case 140 rods of fine woven wire fencing were placed by the State to keep the beaver from cutting poplar trees on the land of two private owners. The fence proved a success.

Wisconsin has not imported any beaver, but has protected them by law for twelve years. There are not large numbers yet, but from time to time reports come in of damage to private property through flowage from beaver dams. While this damage is real in some instances, first

and last the beaver colonists do more good than harm, improving the country rather than damaging it.

Two very high tributes have lately been paid the beaver as a desirable citizen—one by the county judge of one of the northern Wisconsin counties, and one by the land commissioner of a large and wealthy lumber company of northern Wisconsin, as follows:

"Personally, and generally speaking, I am opposed to the extermination of our wild life. I think a good deal of the beaver, especially for the following reasons, among others:

"They furnish one of the very best examples of co-



BEAVER CANAL TO A CREEK

Wherever the beaver cuts his timber he must first make a waterway by lake or canal, and wherever he makes his waterway he is laying the foundation for level, fertile valley and fine forest. It is found a large portion of the fertile meadows and bottom lands east of the Mississippi are the result of his indefatigable industry.

operative industry and perseverance, backed by foresight and good sense; and I believe our children of the present day may well be acquainted with their work and habits. My own boy, going on ten, has been very much interested

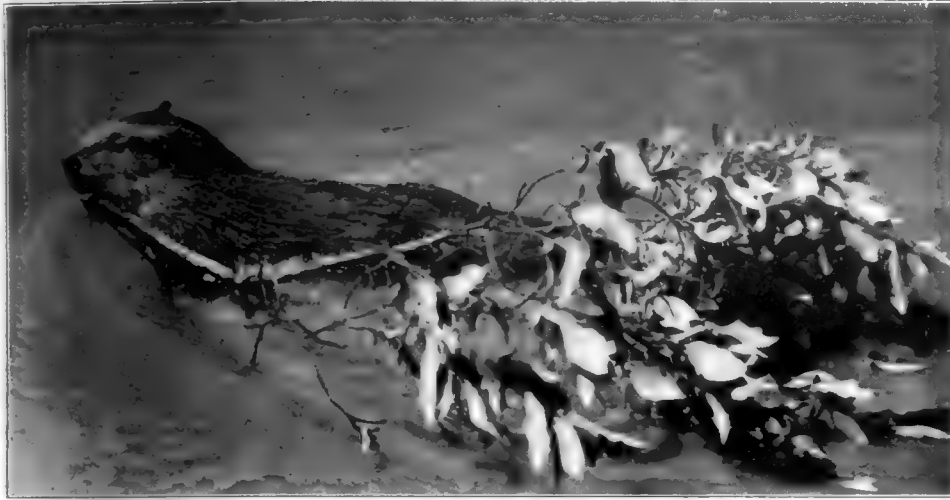
the best class has enjoyed looking over their work.

"But for the present and for many years to come I am in favor of their absolute protection, so far as may be possible, excepting only in particular localities where they are doing real damage. Where they flood lands which the owner really desires and intends to use, or where they persist in flooding highways and bridge approaches, they must, of course, go.

"It must be borne in mind, however, that many complainants have no real use for the land, over the flooding of which they express such deep solicitude, and simply want to start a howl that will lead to their being permitted to trap the animals; and, in fact, in my opinion, most of the 'holler' comes from that class or from men who are easily convinced by and repeat the noise."

The Land Commissioner writes as follows:

"The beaver actually causes but very little damage to the farmer on account of flooding agricultural land. The lands flooded by beaver dams are always swamp lands, and in all cases have been flooded by beavers before there were any farmers in this country. The writer does not know of a single instance where actual damage is being done to agricultural land.



Photograph by courtesy of "All Outdoors."

A BEAVER AT WORK

By his industry and perseverance, the beaver has won the enduring interest and admiration of man. His wonderful, patient labor of cutting his logs, getting them down stream and placing them, of swimming again and again with his little load of mud or stone to chink the dam sets a good example for all of us.

in what he has seen of their activities, and the things I have told him of their habits; and I figure he has gained some good, sound ideas that will help him.

"Then, again, the beaver help a lot by clearing the land along streams, not only by the actual falling of worthless brush and small trees, which means that most of the undergrowth decays, root, stock and branch, before the settler ever gets to clearing the land, so that there is that much less work to do, but also by the flooding of the land, which in itself kills the small growth on the land flooded, with the same result. And in a country like this, this is a much more important consideration than many might think. No doubt you have observed for yourself in your trips up here the many acres of good hay meadow that were originally cleared by the beavers, and which need only to be burned over occasionally to keep them clean.

"And, of course, as the beaver increase, the State has a larger and larger potential investment in valuable fur.

"Of course, it must be admitted that the beaver is not a 'game' animal, not being considered good to eat, and not being the subject of pursuit by sportsmen, although many an outer of



AN EXAMPLE OF CLEAN CUTTING

This shows how the beaver cuts his timber. This cutting has not been removed. He leaves no high stumps, lops off the top and branches, and uses the slash as well as the logs. He also, by creating lakes and canals, establishes fire barriers which have been found of great service in fighting forest fires.

"No damage is being done by beaver to *timber* anywhere. The animals cut down small poplars and eat the bark. This is not marketable timber. The dams do not flood and destroy marketable timber, because the lands flooded are swamp lands and have been flooded by beavers before, and not a tree grows upon the land that can be killed by flooding except willow and alder brush and small second-growth poplar.

"Nine-tenths of all complaints have originated from people who merely want the privilege of trapping and selling the fur. Great numbers of beaver have been killed in this country during the past few years, and the fur shipped out of the State and sold. It is hardly fair to call it trapping, because instead of traps dynamite is used with which to slaughter the defenseless animals while their houses are frozen.

"Forest fires are the greatest menace and drawback to the prosperity of this country, for the farmer as well as the lumberman, which confronts us today. *In unsettled districts the beaver is the only fire-fighter* and the only protection that we have. Their dams, which have been built along small streams, have had the effect of raising the water level in this part of the country on the creek bottoms and marshes, which form most effective barriers against fire. In some cases these barriers extend across entire townships.

"Until within a few years ago there were no beaver in the country, and the water level lowered over three and one-half feet. This had the effect of draining the swamps so that the front went down below the roots of tamarack and cedar timber.

"Such timber did not begin to leaf until as late as the month of August, and finally began to die from want of nourishment. Since the beaver came back no tamarack or cedar is dying; their dams protect us from fires and floods; the waters of the country have been conserved, and we have had no drouth.

"There are large lakes in this country that would be dry were it not for the work of the beavers a century ago. The Government surveyors meandered lakes in many places that became dry land after the early trappers had destroyed the beaver. We hope the time will come when the beavers may reconstruct such dams, and there is plenty of room for all the farmers and all the beaver. We want both, and we assure you that there are just as

The beaver formerly existed in enormous numbers across the whole American continent from the Atlantic to the Pacific. Today they exist in a few localities—but in very small numbers—from the Rio Grande, in Texas, northward through the mountain regions to the limit of trees, and southeastward through Canada to northern New England. Ten years ago it was estimated that there were about a thousand left in Colorado. They are present in a few localities in Wisconsin after having been protected by law for twelve years. In Europe there are so few of these animals left and they have to live under such unusual conditions that they have lost their natural habits.

The flesh of the beaver was formerly esteemed for food and a substance called castoreum was taken from the animal, but the reason for trapping and killing such enormous numbers was the demand for the skins for furs and for the making of beaver hats.

These animals do much more good than harm, and when it was found that their numbers were decreasing with startling rapidity, some of the states began to afford them protection by law. In 1904 the beaver was considered extinct in the following states in which it had formerly been found:

Alabama	Kansas	Ohio
Arkansas	Kentucky	Pennsylvania
Delaware	Maryland	Rhode Island
Georgia	Missouri	Vermont
Indiana	New Jersey	West Virginia
Iowa	North Carolina	

Protective legislation has been enacted in several states.

many people who are land owners that want the beaver protected as there are people who are not land owners and who want the innocent creatures destroyed."

An experience in Canada demonstrates the truth of the observations in the two letters quoted. The inhabitants of a certain district complained to the government of damage that beaver were doing. When the government authorities arranged to capture and remove the beaver a protest against such action was sent. This protest was signed by some of the very individuals who had made the complaint. Here again it was evident that men wanted to trap beaver, and, failing in this, they were anxious to have the animals left in the locality.

A LARGE CLASS

REGISTRATION for the second semester of the College of Forestry at Syracuse has just closed, with 261 men and 1 woman registered as applicants for the degree of Bachelor of Science.

No special students are accepted in the college at Syracuse. Already twenty-five men have signed up for the year of practical work in the State Ranger School, at Wanakena, which opens the first Tuesday in March. Out of the thirty-five men who have been graduated from the State College of Forestry at Syracuse, twenty-eight are in some phase of forestry work. It is not expected that 80 per cent of its graduates will continue to go into forestry, and yet this answers, in a way, the question which is commonly asked as to what men who are going into forest schools may do.

ARBOR DAY IN WASHINGTON

ARBOR DAY in the State of Washington is April 14. On this day much interest will be manifested in forest and bird life through exercises conducted by the various public schools throughout the State. The State Department of Forestry has suggested to teachers and children that the forests may be considered an inheritance given mankind for use, not for destruction by fire; necessary for health, happiness, beauty and service. Health by the purification of the atmosphere; happiness in the home of which some part is constructed of forest material; beauty in the forest verdure; service in the industrial development of the forest resources; and of revenues derived from the sales of timber on school lands belonging to the State of Washington.

The 1915 Forest Fire Season

BY ALLEN S. PECK,

United States Forest Service

THE past fire season on the National Forests, while not so severe as either of the two extremely dangerous years, 1910 and 1914, was in many respects an extraordinary one, and on quite a number of forests tested the efficiency of the protection forces quite as severely as did either of the two abnormal years. The snowfall last winter was generally deficient, except in the Southwest, where it was much heavier than usual. Lack of rainfall throughout the Northwest and on the Coast made a dangerous season alarmingly probable, but late spring and early summer rains remedied the situation, so that it was unusually late in the summer before conditions became especially serious. In the Southwest, after a late start, dangerous conditions continued until the third week in July, when the situation was relieved by the coming of the summer rains. In the Central Rocky Mountain region, while the season started later than

usual, conditions were such as to make possible on one of the Wyoming forests, about the middle of July, the most dangerous fire recorded in that district. In Utah and southern Idaho the fire season was the longest of any in the history of District 4, fires occurring as late as November.

Thus the season throughout the West was characterized by unusual length, which resulted in many fires, in spite of the late start. On the eastern forests and purchase areas in the White Mountains and Appalachians there is very little fire hazard in the summer, most of the fires occurring during the winter months. The total number of fires in the National Forests and purchase areas during the calendar year just closed was something over 6,000, as compared with 7,108 for the year 1914, and a normal annual number of about 4,300. Eighty (80) per cent of the total number of fires were



THE HIGHEST FIRE PROTECTION STATION IN THE WORLD

Recently the United States Forest Service established a permanent fire lookout station on the peak of Mt. Hood, in the Oregon National Forest, where the observer, at a height of 11,255 feet, was able to pick up many fires which would not have been visible to lookouts located at lower altitudes and much nearer the fires.

successfully held by the regular protection forces within an area of ten acres, only 1,200 fires exceeding this acreage and doing any material damage. In District 1, comprising the Montana and northern Idaho forests, where the season was comparatively short but very severe, only 7 per cent of the fires burned over more than the ten-acre limit. While the percentage of fires held within this acreage is considered to some extent as a gauge of efficiency, it is not altogether fair, since the fire-



FIRE LOOKOUT STATION ON THE MOUNTAIN SUMMIT IN THE SHASTA NATIONAL FOREST

Last year four fires out of every five on the National Forests were put out before they had burned over ten acres. Adequate protection of these great wilderness areas depends on continued national ownership.

fighting expenditures are regulated, so far as possible, by the value of the resources threatened and the risk of the fire spreading beyond ultimate control; in other words, a smaller force is used and less money spent in attempting to suppress a fire burning in brush cover which has little value than in the case of one located in valuable timber. This obviously results in the burning over of considerable acreage of brush and open country, which could be greatly lessened through the expenditure of more money, if this were felt to be justified.

The total area burned over during the past season in the Western districts was 235,000 acres, or an average of 10 acres per fire. This compares favorably with the average area of 60 acres burned over the previous season. Preliminary estimates of the damage done indicate that it will be but about \$280,000, as against \$500,000 in 1911, and a loss of nearly \$15,000,000 in 1910, when approximately the same number of fires occurred as during the past season. Comparatively little timber was burned in the past year, except in the forests of Oregon and Washington, where 80 per cent of the total loss occurred. District 6, which comprises the forests of these two States, had more than one-fifth the total number of fires. The extraordinary duration of the danger period in the Northwest is well shown by the fact that while the peak of the fire season usually occurs by the middle of August in that district, it was not reached this

year until well after the first of September. The total of 579 fires reported during the month of September exceeded by 32 the total number recorded during all previous Septembers from 1908 to 1911, inclusive. In California the fire season was not considered as closed until November 10, after a period of over five months, during which it was necessary to keep the forests manned



FOREST RANGER PACKING SUPPLIES

It is a long, hard climb to the top of Mt. Hood, and the supplies for the observer in the fire lookout station there have to be taken up on horses or mules. The forest ranger here shown is about to start with a pack train for the top.

with protection forces, in addition to the regular year-long personnel.

Reports thus far at hand indicate a very marked increase during the past season in the percentage of fires traceable to lightning. Over 40 per cent of the fires during the year just ended are attributed to this cause. In the Montana and northern Idaho forests 60 per cent of the fires this year were caused by lightning. In 1914 lightning and railroads caused approximately an equal number of fires in this region, amounting together to 70 per cent of the total number, whereas in 1915 less than one-tenth of the 970 fires which started were traceable to



ON TOP OF MT. HOOD

The fire lookout station, built by the Forest Service at an elevation of 11,225 feet, where the observer can pick up fires which are not visible to observers at lower altitudes who are much nearer to the fires.

railroads. On the California forests the number of man-caused fires showed a substantial decrease compared with previous years. In view of the increasing use of the California forests, both by the residents of that State and by tourists, this showing is very satisfactory, as it indicates that the aggressive campaign of education in the matter of fire protection which the Service has been pushing for a number of years in California is having tangible results.

When, a year ago, Congress was asked for a deficiency appropriation to meet the expenditure of nearly \$700,000 for fire fighting during the season then closing, it was pointed out that that year had been more dangerous and severe from the standpoint of fire hazard than any previous year in the experience of the Forest Service, with the possible exception of 1910. That greater loss was not sustained and greater expense not incurred was due very

largely to the fact that the field force of the Service was better organized to meet the situation than it had been in any previous year. During the past season, with five-sevenths the number of fires that occurred the year previous, only \$207,300 was spent, while the average cost per fire was but 40 per cent of the 1914 cost. This is in addition to the cost of fire fighting done by regular officers and special protective summer forces on the National Forests.

This extraordinary drop in the cost of fire suppression is undoubtedly due in part to the fact that in the regions of highest hazard fires occurred later in the season than usual, when the days were becoming shorter and the nights cooler. Other factors, however, are the continued development of permanent lookouts for detection and the use of firemen, or "smoke-chasers," who are stationed at strategic points during the dangerous periods and are at all times ready to go to a fire on instant notice. Preparedness pays in fire protection. Quick detection and swift attack by a regular or two often saves a long, expensive fire fight with a hastily recruited crew of volunteers. One especially notable development in detection this past season was the use of Mount Hood, on the Oregon National Forest, as a permanent lookout station. At a height of 11,225 feet the observer at this lookout picked up many fires which were not visible to lookouts located at lower altitudes and much nearer to the fires. A substantial cabin has been built on the summit for use next season, and the demonstration of Mount Hood's efficiency may result in the testing of some of the other higher peaks in the Northwest.

COST OF MAPLE SUGAR

IN a few days the Department of Utilization of the New York State College of Forestry will inaugurate some experiments at the Forest Experiment Station, at Chittenango, with an idea of determining the cost of production of maple syrup and sugar with reference to the small sugar bush, such as is often found in the small farmer's dooryard. It is proposed to ascertain as definitely as possible whether it will be worth while for the small farmer to indulge in the tapping of the dozen or so trees that he may have around his house. The profitable utilization of such small groves may very probably reduce the bills at the grocery store.

FOREST PLANTING IN VERMONT

THE report of the State Forester, recently published, shows that the interest in forest planting is still increasing in Vermont. More people planted trees in 1915 than in any previous year. Altogether over four million trees have been planted in the State by about 500 people since the establishment of the Forestry Department. In order to give a better idea of what this number really means it may be said that the trees are planted in rows 6 feet apart, and there are, therefore, about 4,500 miles of such rows in the State.

Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

EDITED BY J. J. LEVISON, B.A., M.F.

DAMAGE BY SPURS

BY JOSEPH L. RICHARDS, B.S., M.S.F.

"NOBODY loves a lineman." At least, that seems to be the case among people who appreciate the beauty and utility of roadside trees.

Certainly, great numbers of the men in that trade have done much to create this undesirable situation. On the other hand, neither the men of the wires nor the policies of the public utility companies which employ them are entirely to blame for the condition of the shade trees that have stood in the way of electrification. In many instances the tree-loving public has blustered much and done little to supply the means of preventing damage to their trees from this cause. Too often it has relied upon legislation instead of cooperation.

In communities where a municipal arborist is able to keep the wires clear or assist in doing so by detailing the city's trained tree men to work with the line gangs and do all the tree climbing, much damage and discord is avoided. Such arrangements keep men who have neither the training nor the equipment for doing scientific tree work, and whose feet are shod for climbing dead poles, out of living trees. Every wire-stringing public utility company will maintain that it is unreasonable to require it to supply to each of its line gangs the arborist's outfit necessary to do proper tree work. The great majority of them, however, will agree to cooperate in undertakings that will free them from the interference of trees either by planning the arrangement of the trees and wires on the highways or by proper training and care of the trees.

For several years a number of tree wreckers were at large whose activities were nothing short of criminal. Even the excuse of the necessity for maintaining right of way for transmitting messages and power was lacking for the damage which they did in the localities where they operated. These men represented themselves to be tree trimmers. After securing the assent of an owner they proceeded to butcher his trees and trim his pocketbook. The tree trimming consisted of stubbing off the branches without taking any precautions against decay which the arborist takes when he cuts back a failing old tree in order to reduce its top to correspond with the lessened efficiency of the root system and so prolong the life of the tree for a few years. The amount which the trimmer cut off depended largely upon his daring. The size of the stubs left was directly proportional to his caution or fear of falling. In some places, docked trees became stylish, and as a result of this service, the trimmed trees sprouted vigorously for a few years and

then began to fall apart owing to the decay that had gotten in through the unprotected wounds.

The difference between the tree trimmer who uses climbing irons (*i.e.*, lineman's spurs) and the vandalistically inclined lineman is only one of degree. The tree



WOUNDED BY LINEMAN'S SPURS

Section of trunk of Norway Maple, showing 4-year-old wound started from two adjacent spur-marks, both of which are visible. Note the crack through the lower one caused by the drying out of the exposed wood. Cracks like this one hasten the entrance of heart-rots.

trimmer that uses spurs is a strange contradiction. He is in a class with the M. D. who treats a wound and then pricks his patient in several other places with unsterilized instruments.

To get the force of this comparison it is necessary to recall the structure and physiology of trees and point out their relation to the disease organisms which attack them.

For the purpose of discussing the effects of wounds upon the life of a tree its stem may be considered to consist of five components, each completely surrounding its axis. Naming them from the inside outward, they are heartwood, sapwood, cambium, live bark and dead bark. Sapwood, cambium and live bark are always present, even in the smallest twigs. The heartwood and dead bark develop as the stem gets older.

Heartwood is formed from sapwood by the deposits of waste compounds which accumulate in the older cells and kill them. These waste products have preservative

ing or by a coating plus a filling which new growth may cover over and seal up inside the tree.

The live cells of the sapwood contain more moisture and less of the preservative compounds found in the heartwood. The fungi which thrive upon them are more rapid growers. New wood is attacked readily. A small wound exposes the sapwood to infection, so that discovery often comes too late. The sapwood, as its name may suggest, is the part of the stem that carries the sap or water supply of the tree from the roots up to the leaves. When it is attacked by a fungus, the water supply of the branches which are dependent upon the sap currents that formerly passed through the diseased tissue is cut off. Then their leaves wither on the twigs and the branches die. If a sap rot encircles the trunk the whole tree dies.



AN OPENING FOR DISEASE

Trunk of chestnut tree showing effects of chestnut bark disease which entered through the spur-mark slightly above and to the right of the center of the picture.

properties which make the heartwood relatively resistant to fungi and other agents of decay. Nature has evolved fungi adapted to living upon heartwood. They are comparatively slow-going so that considerable time elapses before the growth of the rot overtakes the growth of new wood outside. When it does, the tree either dies slowly from inability to supply its leaves with moisture or is so weakened that it breaks to pieces. The wounds through which the heart-rot fungi get into the wood are usually large enough to be easily detected. If a heart rot is discovered in time it can be gouged out and the sound wood protected from further infection by a preservative coat-



Photo by Alfred Macdonald

DEVELOPMENT OF WOUND

Wound surrounded by a fungus (*Schizophyllum commune*) caused by spur injury.

The cambium layer between the wood and the live bark is by far the most sensitive part of the tree. Its individual cells are as delicate as those of the tiny shoots inside the buds before nature has prepared them for exposure to the outside air. One has only to peel off a bit of bark in the spring and see how quickly both the outside of the wood and the inside of the bark change

color to realize how delicate and sensitive the cambium is.

The live bark is made up of a number of different kinds of cells each having their own functions. Some are long, thick-walled and tough to give the bark the necessary strength. Others are specially formed to conduct the plant foods manufactured in the leaves down to the roots and trunk, where they may be used or stored. There are grit-cells to impede the progress of boring insects, and layers of succulent active cells which, when the time comes, produce layers of cork. These layers of cork are impervious to water. The new layers of cork repeatedly cut off, from water and food, eventually produce the patches of dead bark.

The dead bark acts as a mechanical protection to the vital parts of the tree. It is constantly sloughing off and being renewed from within. The fungi which attack it are effectually excluded from the live bark by the inner cork layer.

The fungi which attack the live bark and cambium are diseases of the active succulent tissues. They are known as bark diseases. They cause the death of the inner bark and cambium and the separation of the bark from the wood. These fungi spread most rapidly through the cambium, because it is made up entirely of delicate, thin-walled, active cells. In the live bark, their progress is impeded by the woody fibers and the grit cells. Once they reach the cambium they use this vital layer, in which all new growth of wood and bark originates, as their line of communication and base of operations and strike out from it into the adjacent tissues as they spread up and down and around the stem. As they spread around the stem, they cut the connections which carry the food compounded in the leaves down to the roots. The roots dependent upon the diseased portions of the bark are starved out and cease to gather moisture for the parts of the tree which they formerly supplied with water. As in the case of the sap rots, when a bark disease encircles the trunk the death of the entire tree results.

All of these fungi, heart rots, sap rots, bark diseases, and those which act in more than one of these capacities are carried from tree to tree by microscopic bodies called spores. The spores are the seeds of the fungi. Great numbers of these spores are produced, and many of them drift about in the air without finding a good place to germinate. All the heart rots and sap rots fail to get a foothold unless they settle upon the wood exposed by a wound in the bark. The disease of the cambium and live bark must find an entrance which reaches past the inner cork layer and leaves these delicate tissues without effective protection. Thus every unprotected wound greatly multiplies the chances for the development of one or another fungous diseases.

For this reason, the arborist protects all openings in the bark of the trees by disinfecting them and waterproofing them as well as possible. Coal tar has disinfectant as well as waterproofing properties so that it is generally used for these purposes. More effective compounds are being sought for each of these uses. In any

case, the protection should be inspected at least annually and renewed at intervals until the new growth or callus which starts from the cambium around the edges of the wounds closes them.

Where it is worth while to take these precautions against invasion by fungi, it is worth while to see to it that neither "tree doctors" nor linemen are allowed to clamber over the trees and poke the bark full of little cuplike holes especially suited to catch the spores of fungi and to conduct them directly to the susceptible tissues. Spur marks are shaped like three-cornered funnels, with the point down, and usually reach to the sapwood.



PROGRESS OF DISEASE

Chestnut log showing rings of bark-disease fungus about spur-mark from which the growth started. Each ring marks the limit of a season's growth.

Not very often, but still in an appreciable number of cases, spurs open the way for heart rot. Figure 1 shows a wound in the bark of a Norway maple caused by spurs. The season during which the spurring occurred was evidently a dry one, for the cambium dried out around the wounds and the process of healing started before any bark or sapwood disease got a foothold. The exposure of the wood caused it to dry out, shrink and crack at the surface. The crack exposed still more wood to drying out. The drying out of the live wood kills it. Heart rots live on dead wood. Thus do spurs open the way for heart rot.

The spur wounds that happen to result in the drying back of the cambium without immediate fungous infection have in them the probability of other bad results. While working on a fine old elm on which the owner had previously spent considerable money, an arborist noticed numbers of light-colored streaks like those which are common below old wounds, but which at a little distance appeared to come out of sound bark. These streaks proved to come from pockets under the dead bark caused by the drying back of the cambium around spur wounds.

The pockets were inhabited by a kind of borer that feeds upon the sap which it gets from the tree by irritating the delicate skin of the callus. The streaks are formed from the surplus sap which, mixed with the excretions of the borers dries on the bark as it runs down the outside of the tree. These borers multiply very rapidly. Their eggs are blown about by the wind in much the same manner as fungous spores. Close examination of the bark disclosed numbers of similar dry pockets which harbored all sorts of insect life. Most of the pockets were about four inches long and two inches wide. One caused by a single spur prick was nine inches long and three inches wide. Healing had been going on four years. The greater part of the damage to come from these wounds had been done or was already brewing. In all probability there were not less than two hundred of these pockets on that hundred foot elm. It would have taken three men at least two days to go over the tree and hunt out and treat all these wounds. This case of spur damage to elm is by no means unique. In one Massachusetts town damage of this sort was called to the attention of the tree warden by a telephone lineman. Oak and ash suffer in the same way.

In the formation of such pockets, the loss of sapwood and bark impairs the circulation of the tree and reduces its vigor. The loss of sap through the feeding of the grubs is a further drain upon its vitality. The insects, hiding in the pockets where the birds that patrol the crevices of normal bark do not get them, eat the leaves and so reduce the supplies of plant food needed to repair the damage. In this way, even without infection, the odds against the life of the tree accumulate from these inconspicuous wounds.

When the fungi that attack the sapwood, cambium and live bark cooperate with spurs, the damage is quickly, stealthily and thoroughly done. Figure 2 shows a sample of the results of spurring followed by sap rot infection. The triangular opening in the bark, to the left of the crack from which the fungus brackets protrude, is a spur mark.

The upper sides of several limbs of this Norway Maple were spur-marked every few inches for from eight to twelve feet. Almost every spur mark was a center of infection. The entire upper side of each of these limbs was dead when the withering of the leaves and the appearance of the fungus brackets disclosed the injury. The damage to the tree was too widespread to be remedied.

The fungus which did this damage is a common native species that attacks wounds on many of our broad-leaved and evergreen trees. There are many others with similar habits which mycologists consider more dangerous.

Maples are relatively thin-barked trees. Infection of thick-barked trees through spur marks would seem less likely. Unfortunately, thick bark is not uniformly thick. The crevices afford better holds for spurs than the ridges do. Even on old thick-barked trees, where the dead bark is tough enough to hold and thick enough at the base

of the trees to keep spurs from reaching the live tissues, the bark on the upper part of the trunk and upon the branches is relatively thin.

Chestnut is a fairly thick-barked tree. The one shown in Figures 3 and 4 had been failing noticeably the summer before it was examined. That spring the new leaves on several large branches had dried out when only partially expanded. Those on other branches were dwarfed. The bark over a large part of the trunk, within reach of the ground, sounded hollow. The first patch of it which was removed disclosed the conditions shown in Figure 3. Near the center of the dead area there was a dimple in the wood which corresponded with a spur mark in a crevice of the bark. The spur appeared to have only just pierced the cambium, for the wood was deformed but not splintered. About this dimple was a series of bands of the fungus known as Chestnut Bark Disease. On the other side of the trunk was another dead patch which came from a spur wound (Figure 4). In this case the spur penetrated the sapwood and splintered it. The rings of fungus growth show clearly how the disease spread from the jab. In five seasons, unheralded by any outward signs, the fungus had grown more than a foot around the trunk and several feet lengthwise. The damage from the other wound was even more extensive.

The upper sides of the lower limbs of this tree were honey combed with spur marks for a foot or so from the trunk. There was no thick bark there to prevent each jab from puncturing the cambium. One hundred and fifty would be a conservative estimate of the number of spur marks on the tree. The infected branches had, of course, been encircled by the fungus and their sapwood had dried out. Under the circumstances the only question which could arise as to the fate of the tree was whether it should be removed by inches or all at once.

From what has preceded, it is evident that when used on living trees spurs can cause heart rot, disfigure their victims superficially, aid the insects and other small animals which attack them, and infect them with sap-rots and bark diseases in so many places at once that treatment is generally futile by the time the damage is discovered. The carelessly used hatchet or saw can not cause any greater variety of tree troubles, and has the advantage of showing the location of the damage done in time for proper treatment.

The arborists in charge of valuable collections of trees, belonging to both public and private institutions, have long appreciated the risks run in using spurs and do not permit them to be used upon their trees. Lay owners, who have learned the lesson through the untimely death of a pet tree, refuse to add to the dangers with which their trees must contend by taking these risks. There are special considerations, such as the economical control of pests upon trees whose replacement by other kinds, less attractive to the insects, would be beneficial, which would justify taking the spur risk. But, anyone desiring to prolong the life of a tree will keep spurs away from it.

QUESTIONS AND ANSWERS

Q. I have been asked to outline a plan for a shade-tree department to systematically plant and care for the city's shade trees. Can you give me an itemized estimate of the probable annual cost of maintaining such a department, including city forester, necessary assistants and material, for a city of 100,000 population. The work needed includes a shade-tree survey to determine the needs, pruning and spraying established shade trees, replacing partly-grown cottonwoods and other poor stock, and making new plantings. About what salaries are city foresters receiving?

F. I. R.,
Coeur d'Alene, Idaho.

A. Generally speaking, a shade-tree commission should consist of five members responsible to the mayor, and appointed on terms expiring in different years so that it may always have among its members someone who has had more or less experience in the work. It should be also allowed certain fixed revenues with which to carry on its work. This may be done by providing an annual tax levy of say three-fourths of one mill tax for shade-tree purposes, and, as has been done in some cases, an additional tax of 10 per cent of all licenses and fines collected by the city. The latter should only be resorted to if the revenue is insufficient. A technically trained forester should be appointed from the start and a set of tree ordinances, such as Mr. Levison has drawn up for the city of Rome, N. Y., long ago, a copy of which we are sending you, should be installed. After this, the forester should be provided with a good foreman, a set of equipment and a crew of at least six men. The salary of the forester should be at least \$1,200 to \$3,000, but \$1,200 is the usual price for a beginner. The annual wages of a foreman will be about \$900, and the wages of the six men will be about \$3,600. In addition to this it will be necessary to spend about \$1,500 on teams, about \$200 on tools and about \$400 on a spray outfit, if conditions warrant it. The cost of material and the trees for the first year will vary with the amount of work done, but \$500 will be least estimate of cost of such work. The cost of the survey should not be included as an item, because that will be done by the forester and the foreman along the lines suggested by Mr. Levison, in the Shade Department in this issue relative to a tree census. If, in working out your system, there are any specific questions you desire to put, do not hesitate, and we will give you our best information, on request.

Q. Please advise what practical method you would advise for taking a shade tree census.

N. R. M., *Harrisburg, Pa.*

A. In Brooklyn, N. Y., a census of city trees was taken ten years ago and consisted of the following method: On one side of a plain card was indicated the approximate location of the trees on the block, using a system of colors to designate good, bad and dangerous trees; those that had a cavity were marked with a small "c," and those that were particularly dangerous, or otherwise

important, were noted with the number of the house alongside of it. Cards were made out for each block and were filed consecutively for each street and the different streets were then filed alphabetically. In this way it was possible to locate any block in the street and tell, in a general way, the condition of the trees on desired block and their approximate location. Whenever there were any trees removed from the city streets, any new ones planted, or any other changes made, it was noted on the card and in that way they kept changing the records and always had the census up to date.

This plan entailed no laborious work such as would be required in the making of maps and, for practical purposes, served better than any formal maps or elaborate sheets would have done; as a matter of fact, it was found that the tree census has its principal value in the beginning of shade-tree work, in helping the tree warden or city forester to acquaint himself with the conditions of trees, their number and the need for additional planting; but after its first or second year's service, the census becomes less and less important until, eventually, it is nothing but a matter of record rather than a practical help in the field.

Q. I am sending you two small branches from the limb of a tree that retains what would seem to be the seed pod of last year, and showing new budding, to ask if you would kindly designate the kind of tree. It is a very much-admired tree, the four or five specimens having been brought here more than 45 years ago, and we have been told it is a cypress. But there are no cypress-knees apparent (if there were very small ones, the filling in of the ground covered them) and there is doubt as to the kind. The foliage is as dainty as a maiden-hair fern, and a few of the townspeople have been very anxious for their preservation. A man who bought part of the lot with two or three of the trees, raised the grade, regardless of those valuable trees, and badly injured the bark on one, but so far they have stood even that ill treatment. I have been told some trees stand the raising of the grade close to the tree trunk; is this one?

J. A. T.,
Asheboro, N. C.

A. Replying to your inquiry, would say that the tree of which you have submitted a specimen is a Bald cypress. The knees, which are characteristic in its native locality, are not always present and all the trees of this species which you find in cities do not show these knees at all. The knees are an adaptation for the purpose of absorbing air and are only important in cases where the trees stand in swamps and cannot get the air directly from the roots. The knees, under the circumstances, serve to draw the air above water. On city streets or on lawns, there is no reason for the presence of these knees and consequently they are lost. As to the filling of soil around such trees, I have seen many cases where a slight filling of about one foot or even two feet has not hurt the tree at all, but it is important in all cases to keep the soil away from the bark of the trunk

in order to prevent decay, which may set in in due time. The specimen which you sent shows the presence of the "bag worm," an insect which spends the winter in a baglike covering and which emerges in the early summer and feeds on the foliage. You probably have not noticed this bag worm, and I am, therefore, returning the specimen so that you may see it. If these bag worms are numerous on the trees it is a wise thing to remove and destroy them at once before the mature caterpillar emerges from those winter nests.

Q. We have just organized a shade tree commission in our city and would like to know what to do next towards caring for our trees. H. C. U., Pa.

A. Appoint a city forester or obtain the services of a consulting arborist to make an inspection of the trees and to prepare a detailed working plan for the first year's work. He will soon be able to report on the number and variety of trees growing and extent of work necessary. He will point out the trees and branches that are dangerous and should be removed at once. The control of insect pests, the protection of trees from mutilation by horses, etc., the need of planting new trees and the kinds suitable, the incorporation of a street tree ordinance, etc., will receive his further consideration.

From his report you will be able to determine what appropriation is absolutely urgent for the first year and just how to organize the force of men that will take care of your trees.

ADVICE FOR APRIL

SPRAYING

Prepare for spraying campaign during May and June. It would be well to procure at an early date the following chemicals in proportion varying with the quantity of work to be done: Arsenate of Lead, Whale Oil Soap, Bordeaux Mixture.

PLANTING TREES

This is the month for planting, and the following suggestions on how to plant are of value:

1. Plant when frost is out of the ground.
2. Keep the roots well protected from the minute the tree leaves the wagon or trench to the minute it is planted. Do not take more plants from the wagon than is absolutely necessary.
3. Cut all broken roots and cover wounds with coal tar.
4. Cut back the branches, but do not remove them entirely unless they interfere or are too thick. With some trees like the sycamore, oak or poplar, you can cut back more than with the others. Do not cut the leader, and do not cut evergreens.
5. Let only good soil come in close contact with the roots, and have the good soil well packed around the roots; work it in with the fingers and stamp on it. Place the poor soil only on top.
6. See that the tree is planted upright and firm.
7. Plant the tree no deeper than it stood in the nursery.
8. Water the tree only after good soil has been put around its roots and the hole filled.

CARE OF TREES AND SHRUBS ON ARRIVAL

Before the plants arrive, dig a trench from two to four feet wide, one foot deep and long enough to hold them all.

As soon as the trees or shrubs arrive, untie them, keeping each kind separate, and place the plants in the trench temporarily until they can be set out in their

proper places. Very carefully cover the roots with earth and give a copious watering. In unpacking the plants, in placing them in the trench, or at any other time, be careful *not to expose their roots, even for a moment, to sun or wind, and at all times keep the roots moist.*

In case of evergreens, the slightest exposure is apt to prove injurious.

WHAT TO DO AFTER PLANTING

1. It should be borne in mind that when a tree is transplanted, no matter how carefully the work is done, it is impossible to take up the entire root system, and, therefore, before it is able to care for itself, new roots must be formed to take hold of the soil. In the meantime, the moisture is being continually evaporated from the trunk and branches by the action of the wind and sun, and this must be balanced by an artificial supply. During the dry spells and hot weather of the following season, the soil around the base of the tree, for a space wider than the hole, should be stirred up and watered. **WATERING DURING THE FIRST SUMMER IS VERY ESSENTIAL AND MORE IMPORTANT THAN WATERING DURING THE SUBSEQUENT SUMMERS.** The water should not be sufficient to make the ground soggy. For a tree about 2½ inches in diameter, two pails of water applied twice a week is enough.

2. In the fall a layer of old manure 3 to 4 inches thick should be spread over the surface around the tree to a distance of a foot or two beyond the line of the newly filled hole. This treatment will enrich the soil, shade the ground and help to hold the moisture.

AMERICAN FORESTRY FREE

Have you friends who love trees, woodlands, forests? Send their names and addresses to the American Forestry Association. A free copy of American Forestry will be sent them with your compliments. Do it now before you forget.

First Fire Protective Organization

BY W. R. FISHER

Secretary the Pocono Protective Fire Association

THE Pocono Protective Fire Association, of Monroe County, Pennsylvania, incorporated in 1902, was the first private organization formed in the United States for the protection of the forests from fire, and it stood alone for four years before a second association was organized, in Idaho.

It is said it should have been called a fire protective association, not a protective fire association. But the question of an appropriate name was fully discussed when the association was formed, and the arrangement of words as they now stand was deliberately adopted by the founders.

The association had its origin in the office of a railroad company. The railroads have to shoulder so much blame and so much responsibility for damage done to the woods that it is a satisfaction to be able to record the fact that credit belongs to the Lehigh Coal and Navigation Company, of Pennsylvania, for first carrying into successful operation the idea of organizing a group of citizens and banding them together to prevent and suppress forest fires. This corporation owns large tracts of land in other parts of the State, outside of Monroe County. *AMERICAN FORESTRY* for August, 1915, gives an interesting account of recent work by this company in reforesting some of these lands in Carbon and Schuylkill counties.

Another peculiarity that marks the Pocono Protective Fire Association and distinguishes it from other protective associations, is to be found in the character of its membership. Most of the private protective forestry organizations of the country are carried on with the avowed object of preserving the trees as timber for future use. Such utilitarian motives have their influence with some of our members who own large tracts of land, but the greater number have been led to join for esthetic reasons only. Hundreds of people from many States visit Monroe County every

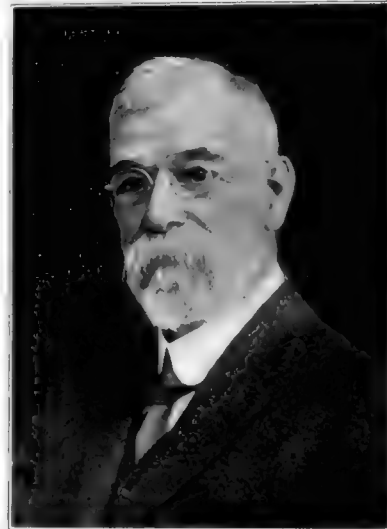
year, attracted by its scenic and climatic advantages, seeking for rest, for sport, for recreation, or for health. Many of these own little or no property in the county, but they are deeply interested in the preservation of the woods as objects of beauty to the landscape, as shelters to game, as protectors of the water supply; and they willingly pay a yearly fee to help on the work of the association. Eight States, extending from Massachusetts to Maryland, have representatives upon its roll of membership, and thus the association widens its influence and helps to spread abroad an interest in forest protection. We have more than doubled our membership during the past year, and now carry 224 names on our roll.

The association has two distinct lines of work—one is to render direct assistance to the State Department of Forestry in fighting forest fires; the other is to keep before the public mind the value of trees, and

to teach the individual what each may do and ought to do to protect the forests from damage by fire. The State is helped by contributions of money for the support of a fire patrol by the erection of observation towers and by printing and posting warning notices about forest fires throughout the county. The educational phase of the work, although less conspicuous than an activity displayed in fighting fire, is in reality more helpful to the State and more productive of lasting results. Practical foresters agree that a ready and willing disposition to respond promptly to calls for fire fighters on the part of the residents in wooded districts is essential to a successful fire service. Little can be done by legislation without a favorable public sentiment to back it. It is the province of associations like ours to develop and to foster this sort of cooperation; for a private association is able to reach the people of a community in a direct and friendly manner, where formal and impersonal methods of State officials



E. A. HOOPES
President



W. R. FISHER
Secretary

The Pocono Protective Fire Association of Monroe County, Pennsylvania.



J. A. SEGUIRE
Vice-President

might not succeed. Most people are entirely ignorant about the forestry problems of the day. Consequently, there is no popular interest in such objects. The public needs information about the frequency, the extent, of forest fires, and the losses that result from them; about the dangers of the careless use of fire in the woods; about the best methods to control and suppress fires, and many similar subjects. Our association is distributing such information by means of articles in the newspapers, by advertisements, and by circulating printed matter of various kinds relating to forest protection.

With the same object in view, prize essay contests have been established in the schools of the county to interest the young people in the forests and to carry into the homes of the people the discussion of the subjects of these essays.

Little by little the foundations of a firm and permanent structure are being laid. Indifference and prejudices are breaking down before enlightenment, and the future prosperity of the association appears to be assured.

The Forest Pleadings

(Arbor Day Recitation For Six Pupils)

BY E. T. ALLEN

First Pupil (Carrying Evergreen Branch):

I AM THE FOREST.

I clothe this glorious land
With beauty and on every hand
You turn to me in daily need.
Your best friend I have always stood;
You could not live not using wood.
For our protection now I plead.
Nor do I bid you take my word;
Let these my witnesses be heard.

Second Pupil (Carrying Pail of Water):

I AM THE STREAM.

From my woodland springs
To river mouth where the white gull wings
Over the ships from the ends of the earth
I flow to your homes and mills and fields
And carry the freight that the harvest yields,
But shady forests gave me birth.

Third Pupil (Carrying Pet Animal):

I AM THE WILD THINGS.

I speak for graceful deer
And flashing trout in brook, pools clear,
For singing birds and squirrels pert,
And all the wearers of feather and fur.
What should we do if no forests were
To shelter us from fear and hurt?

Fourth Pupil (Carrying Ax):

I AM INDUSTRY.

To me the forest brings
Reward for labor and all things

That money buys, for in this state
So much of our wage-earners' pay
Comes from lumbering in some way.
The fate of forests is my fate.

Fifth Pupil (Carrying Fishing Rod):

I AM PLEASURE.

Happy vacation days,
Camping, hunting, and all the ways
Of nature in her gladdest moods.
The forest holds for girls and boys
Who love out-doors and wholesome joys—
There is no play-ground like the woods.

Sixth Pupil (Strikes Match and Holds it Burning):

I AM THE FUTURE.

Shall all these pass away?
Must we look forward to a day
Of fire-charred, lifeless, streamless slopes
Where thoughtless match or unwatched brand
From man's ungrateful, careless hand
Has destroyed his own children's hopes?

All (Future blows match out, watches as he drops it, then tramps it out):

FIRE IS OUR ENEMY.

Won't you help us, then?
Learn yourselves, and teach all men,
This, the lesson all must learn:
*Put out the campfire and the match;
Careful with slash and clearing-patch;
Leave no fires in the woods to burn.*

Electric Power Development in the U. S.

Review of a Report of Secretary of Agriculture Houston to the United States Senate

BY H. H. CHAPMAN

THE policy of the nation with regard to its publicly-owned waterpowers is now under consideration by Congress. The many technical difficulties surrounding the subject and the absence of authoritative information have led to misstatements and misunderstandings. This report is peculiarly welcome. Setting forth, as it does, a summary of statistics dealing with the total amount of power of all classes available and utilized, by regions, the rate of development and its relation to demand, it will do away with much superfluous discussion.

The total available waterpower for the United States, owing to dependence on fluctuations of stream flow, is calculated as minimum, representing the capacity during two weeks of minimum flow, and the maximum, given as the average for six months of maximum flow. These figures are, respectively, 27,900,000 horsepower and 53,900,000 horsepower. Of this quantity 31 per cent is located on lands owned by the United States within National Forests in the West. Seventy-two per cent of all waterpower lies in the western or "National Forest" States and of this total, 42 per cent is on national forests. The regulation of publicly-owned waterpower sites is, therefore, a question which intimately concerns the Forest Service.

By far the most interesting facts brought out are the summaries which show the relation of waterpower to the total present developed power from all sources in different States, including steam and gas power. In 1912, power, including steam, water and gas, totalled 30,450,000 horsepower, of which steam generated 24,340,000 horsepower or 80 per cent, and water 4,870,000 horsepower, or 16 per cent, a proportion of 1 to 5. Waterpower in the last three years has developed more rapidly than steam. The increase in primary power for municipalities, street railways, and commercial purposes using in 1912, 11,190,000 h.p., or 36.8 per cent, added 2,770,000 h.p. by 1915, of which 1,668,000 h.p. was waterpower, and but 1,100,000 h.p. steam. But it appears that in every group of States except the western mountains and Pacific coast (containing 72 per cent of all waterpowers) the present total combined power installation *already exceeds the minimum capacity of all the waterpower sites, and in five out of seven groups of States it exceeds the maximum capacity of all waterpower that can be developed.* This excess, due to steam, and dependent on coal, amounts in New England, the Middle Atlantic States, the North Central and the West South Central States, to 171 per cent of waterpower capacity. Two points are at once clear: waterpower can never

supersede steam power as a whole, and waterpower must always compete with steam in the power market.

Claims have been boldly and repeatedly made that the policy of regulation in force on the National Forests has produced complete stagnation and prevented the development of the waterpowers on these lands. The facts are as follows: In the decade 1902-1912, total combined power installation increased in the eleven western States by 240 per cent, as against 98 per cent elsewhere. Electric power in the entire country increased by 226 per cent, but in the West, by 440 per cent, which was two and a half times as rapid as a per capita increase as the average. Waterpower increased for the country by 98 per cent, and for the West by 451 per cent, the per capita installation now being four times as great as for the rest of the country. In the three years since 1912, in the West, primary installation has increased 47 per cent, or at the rate of 296,000 horsepower per year, of which three-fourths is waterpower, the additional annual installation being twice as great as for the five previous years.

Instead of stagnation, overdevelopment of power exists throughout these western States. Especially in California, Washington and Oregon installation is far in excess of demands. There is more developed power than can be disposed of, and the need is for more markets. Instructive figures are given showing that by contrast with municipal plants, private waterpower corporations are capitalized for at least twice the cost of development and that the so-called "cost" of these plants is, as usual, merely the "value as an investment" on the basis of probable income.

With reference to national forest lands, it is shown that out of 1,800,000 h.p. of waterpower alone, representing the development in 1915 in the West, 30 per cent is in *plants located wholly or in part on National Forests*, while an additional 12 per cent depend in part on National Forests for their storage reservoirs. Fourteen per cent are on other public lands. This makes a total (exclusive of plants touching national property by transmission lines alone) of 56 per cent of the total developed waterpowers of the West which has been installed *under permits issued by the Forest Service or the Interior Department* and in spite of these facts, we have heard reiterated claims that the present system of permits and regulations has made development impossible. In addition, there is under construction on National Forests, plants aggregating 123,000 h.p., while final permits are issued for 420,000 h.p. additional, and preliminary permits for 354,000 h.p., a total of 897,000 h.p., equalling 50 per cent of all waterpower now in use in the West. That this

increase of 50 per cent will actually take place *under present regulations* as rapidly as the market permits is clearly evident by the fact that no applicant can hold even a preliminary permit without an investment in surveys and plans and evidence of good faith, while for the final permits, construction must be commenced within a given time or the permit lapses.

The report, while indicating a rapid concentration of waterpowers in the hands of a few large companies, also indicates some of the reasons for this concentration. Fixed or permanent investment in waterpower is much greater than for steam power, and in 1912, only 24 per cent of the installation capacity was actually used or marketed, due to the necessity of providing for "peak" loads, maximum demands for service, and growth of service. "To secure advantages attendant upon diversity of demand is one of the chief reasons for joining many plants and many markets into one combined system." Public service corporations in 1915 owned 90 per cent of primary power in the western States as against 50 per cent in 1912. In the country at large 35 corporations control by direct ownership one-half the total public service powers and 6 corporations own over one-fourth of this total and in addition there is "a marked tendency towards association or community of interests, particularly between principal-holding companies that cannot be viewed without concern."

Perhaps the most significant fact brought out in this report is that 120 public service corporations out of 1,500 claim to own or control 3,683,000 horsepower undeveloped. This equals 80 per cent of the total waterpower developed and used in public service operations in the entire country. *No permit restrictions prevent the immediate development of this unused waterpower which is annually wasted.* Under government permits these waterpowers could not be held without development and use.

The report does not discuss waterpower legislation or existing policy and regulations, but the facts set forth cannot fail to remove many prejudices and enable Congress to approach the subject on a clearer basis.

NATIONAL CONSERVATION CONGRESS

THE National Conservation Congress has called a conference for the mobilization of America's resources for national defense to be held in Washington, D. C., May 2, 3 and 4. The conference is announced for the purpose of devising an answer to the following question:

"The world crisis has awakened the American people to the imperative need of immediate steps toward greater national strength and efficiency. The first step is the organization of the country's natural resources. Can the magnificent resources of the United States—men, industry, power, and the riches of the earth—be organized into a single co-ordinate unit that will be the sure defender of democracy in her hour of greatest peril and her greatest support in time of peace?"

The idea of the development of the country's resources will loom large, so the call for the conference states and it adds: "President Wilson has been advised of the plan and will be invited to speak on the subject. Foremost government and state experts in every line of industry and commerce are already at work with a view to laying before the conference, immediately on its assembling, the exact status of the country's resources and plans for their development and use with the idea of promoting the greatest possible national strength and efficiency.

"To the conference have been invited the Governors of the States, Senators and Representatives in Congress, members of the Cabinet, the Justices of the Supreme Court of the United States, the heads of State and government departments and bureaus, representatives of the leading organizations of the United States and experts, leaders of commerce and industry, transportation and labor, scientists, college presidents and noted men generally, whose expert ability in special lines of the country's resources is widely recognized.

"At the conclusion of the conference, it is hoped there will be ready to present to the President of the United States and to be given out to the country a practical plan for the mobilization of the country's resources for whatever purpose it may be desired. The conference will awaken a greater interest in America's resources and will instill a spirit of greater patriotism.

"The conference will continue three days. The first day will be devoted to topics tending to bring out the idea of a patriotism for national development. On the second day, will be taken up plans for the mobilization of the country's resources. Accurate data on the mobilization of resources from authoritative sources of the states and of the government and from outside experts will be presented and given to the public for the first time. On the third day, the conservation of human efficiency will be considered. Besides addresses by the leading men of state and nation, there will be reports from every section of the country relating to every phase of the national resources. A special feature will be addresses by prominent representatives of foreign countries, now naturalized Americans.

"At the evening sessions and other times, there will be illustrated lectures with thousands of feet of moving picture films, showing the development of the nation and also the possibility of its further development."

NORWEGIAN FORESTERS COMING

A DELEGATION of forestry experts from Norway is to spend six or eight months on the western coast of Canada and the United States this spring, obtaining information as to the various kinds of timber and pulp wood tree species growing on that part of this continent which are likely to prove suitable for plantation in western Norway. Western Norway is but sparsely forest covered and it is intended to replant it.

Wood Preserving Department

By E. A. STERLING

Ex-President American Wood Preservers Association

FOR the past year preliminary reports have indicated the successful development of improved methods of creosoting Douglas fir timber. Mr. O. P. M. Goss, engineer of the Association of Creosoting Companies of the Pacific Coast, who has been directing the investigations, presented a very interesting report at the meeting of the American Wood Preservers Association in January. The association he represents has now published a bulletin on "Creosoting Douglas Fir Bridge Stringers and Ties Without Loss of Strength." While the details may not be of interest to the readers of AMERICAN FORESTRY, the general results are important to any one in any way interested in the use of timber. The practice of creosoting Douglas fir has been followed on the Pacific Coast for approximately twenty-five years, but the boiling process which has been used has been rather severe, because of the resistance which fir offered to penetration by creosoting. This resulted in considerable loss of strength, which was not a desirable factor in structural timbers. The new method which has been developed consists in boiling under vacuum in order to reduce the high temperature previously necessary. Mr. Goss's bulletin outlines the detailed procedure, including strength and spike pulling tests. He summarized these conclusions before the Wood Preservers Association, as follows:

"The above results show conclusive proof that Douglas fir stringers can be effectively creosoted without injuring their strength, a fact which will be of interest particularly to railroads, and also to other consumers of structural timber."

ADDITIONAL data of great value on Douglas fir bridge stringers were presented by H. B. MacFarland, engineer of tests of the Santa Fe Railroad, in connection with the report of the committee on wood preservation of the American Railway Engineering Association, at its meeting in Chicago on March 21-23. Mr. MacFarland's tests are on the comparative strength of treated and untreated Douglas fir stringers in order to determine the effect of the treatment on the physical properties of the wood. This report is very complete, and fully illustrated by photographs of cross sections, and by curves and diagrams of each piece tested.

FURTHER evidence of the long life of creosoted material is hardly necessary; yet each year and each meeting of railroad wood preserving and engineering associations bring out new data. At the recent meeting of the American Railway Engineering Association, and at the January convention of the American

Wood Preservers Association, committees on service tests presented many records, among which was mentioned creosoted piling and timbers in coal docks of the Lehigh Valley Railroad at Perth Amboy, N. J., which were still in good condition after thirty years. Other complete records run back twenty-six years; while from other sources are data on creosoted piling which have resisted decay from marine bores for forty years in the Gulf of Mexico. Some later experimental test tracks are now giving results, cross ties from the Santa Fe Railroad, for example, being shown at Chicago in March, which were treated by the Reuping process with five pounds of oil per cubic foot in 1904, and are still entirely sound. The deduction is that timber well treated with a good grade of coal tar creosote will resist decay almost indefinitely. The same evidence, however, shows the necessity of proper protection from mechanical wear, since there are many records of ties and timbers which have failed because the protective treated portion was worn through, exposing the untreated center.

AT THE various lumber association meetings during the past winter exhibits have been shown which are of particular interest to the farmer and small consumer of creosoted wood. These included results from brush and open tank treatment of fence posts and small timbers, and included a model of an inexpensive open tank which any one can build for a few dollars. It was shown by actual specimens that posts of non-durable wood, for example, would decay in two to five years; whereas a brush and open tank treatment with creosote would preserve them for fifteen or twenty years, and in some cases more.

ANew feature was added to the exhibit of the National Railway Appliances Association in Chicago in March, in connection with the annual Railway Association meeting, by the increased space taken by lumber manufacturers, and the very instructive demonstration which they arranged. In addition to many sections, diagrams and models of untreated timber, the results from proper treatment were also shown. There were, for example, well preserved sections of creosoted timbers taken from trestles of the New Orleans & Northeastern Division of the Queen & Crescent, and from the Louisville & Nashville, built in 1883. Samples of paving blocks were also shown which were laid in Galveston in 1875; while another part of the exhibit illustrated methods of preventing mechanical wear of cross ties by the use of screw spikes, large tie plates, dowels, etc., the possibilities of the dowels having been previously mentioned in this department.

Uses of Lumber

BY WARREN B. BULLOCK

ONE of the biggest educational movements in America today is the teaching of the man who uses wood, the proper use of lumber for structural work in the factory, house or farm building, or any of the thousand and one purposes for which wood may be used. Every part of the country is feeling the impetus of the new movement, fostered by the national manufacturers of all kinds of lumber, and spreading down through the wholesalers, jobbers and retailers to the every-day man on the job. Even the schools have taken up the movement. The organization by the University of Wisconsin of an extension course for users of lumber to teach the natural properties and best uses of wood, a course which has in its first year included hundreds of correspondence students all over the country, with sixty-three men in regular classes in Milwaukee, has spread to twelve other educational institutions, State universities, State colleges of agriculture, and private educational institutions. A dozen others will institute the course in another year, according to plans being made by various extension course leaders.

The theory back of the whole movement is that wood "the indispensable," is the best material for many kinds of construction work, and that the lumber industry should not try to force the use of lumber where it does not fully meet all requirements, but should concentrate its efforts on the education of the public to use wood where wood is best.

This national movement, backed by the trade extension department of the National Lumber Manufacturers Association, has its local manifestations in the Southern pine, and cypress men in the South, the Douglas fir and redwood men in the West, the hemlock manufacturers in Wisconsin, and so on all over the country, until the national movement has been taken up in a dozen ways by associations representing district or species, which first study the qualities of their own output and then prepare educational literature plans and specifications for the use of architects, engineers and consumers, to show where and for what purposes specific woods are the best.

There is no longer any excuse for the ignorant use of wood in any work, and any prejudice which may exist against the use of wood is due to lack of knowledge of how to build well with wood. Every one of a dozen or so organizations is ready to provide any builder with detailed general or technical information as to how best to use wood, and what woods to use for special purposes.

One of the great problems of the lumberman today is that of fire, not only the fires in the forest, but the fires in buildings, and there has been an enormous amount of work done throughout the country in studying the problem of how to build structures so as to minimize the danger of damage from fire. The whole question is be-

ing worked out on the basis of proper construction, adequate safeguards, elimination of hazardous contents and carelessness, and the use of automatic sprinklers. A great many reports on fire prevention and the use of structural material in buildings, state that a carefully designed timber structure is as safe against fire as any other type of structure if all floors are isolated, elevators and stairways enclosed in fireproof shafts with all openings protected by self-closing doors, and proper sprinkler systems used throughout. A heavy timber which has been charred by fire becomes of slow burning nature due to the charred coating, in the same manner that a solid log burns slowly.

This is only one of the phases of education being developed by engineers on behalf of the campaign for the use of wood where wood is best.

THE immense possibilities of developing southern pine and Douglas fir waste into wrapping paper have been reviewed for the members of the United States Senate Committee which has under discussion the proposal to increase the scope of the laboratory investigations, in the following memorandum on the production of Kraft wrapping paper from southern pine and Douglas fir, by Chief Forester Henry S. Graves:

"The waste incident to the production of southern pine lumber is of sufficient quantity to produce the enormous amount of approximately 20,000 tons of paper per day. Laboratory experiments have determined the suitability of this material for the manufacture of Kraft wrapping paper by the sulphate process and it now only remains to determine to what extent the laboratory results are applicable on a commercial basis.

"What has been said of the possibilities of southern pine is largely applicable to Douglas fir. While the Laboratory experiments with this species have not progressed to the same point as with the southern pine, the indications are that Douglas fir is also well adapted for production of Kraft paper and subsequent to the completion of the suggested work on pine, it would be my idea to utilize the experimental equipment secured for this purpose in similar work in the West with Douglas fir. Wrapping paper in this territory is at present secured from either western paper mills using sulphite pulp or from eastern and European mills supplying either sulphite or Kraft wrappings. In the latter case, it is of course necessary for the western consumer to pay freight charges amounting to about \$15 per ton. The Laboratory recently made paper of Douglas fir which tested a point to the pound, putting it in the class with the strongest wrapping papers made in the United States."

Brother Jonathan

BY CHARLES ALEXANDER RICHMOND
President of Union College

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I

Brother Jonathan sat by the kitchen fire,
Nursin' his foot on his knee.
"It's a turrible fight they're havin' out there,
But they can't git over to me."
And Jonathan jingled the coins in his han'
An' thanked the good God for the sea.

II

"They'll be wantin' my cattle and hogs and corn
An' powder and guns, mebbe,
But they'll pay on the nail! cash down, by gum!
For all they git from me."
An' he smiled kinder slow and jingled the coins;
"It's good for business," sez'ee.

III

"They're killin' 'em off like flies, they say.
They can't blame it onto me.
It ain't my war, yet I do feel bad
For them poor Belgiums," sez'ee.
And he took a few dollars out of his jeans
And sent it across the sea.

IV

Then he heard they'd drowned a thousand men,
And some from Amerikee.
So he said right out, "If you do that ag'in
You'll git me mad," sez'ee.
An' he kep' on jinglin' the coins in his han'
An' thankin' God for the sea.

V

They did it ag'in and then ag'in.
"You quit that now," sez'ee.
"I'll give you fellers a piece o' my mind
If I git hol' o' ye."
An' he winks one eye with his tongue in his cheek;
"I'm too proud to fight," sez'ee.

VI

Then they got to plottin' and blowin' up things,
An' he sez: "You let me be.
I won't stand these furrin tricks o' yourn
In this here land o' the free."
And it got old Jonathan all het up,
An' he took his foot from his knee.

VII

An' he got to thinkin' and thinkin' hard,
Worryin' how it would be,
An' wonderin' what in Sam Hill he'd do
If some pesky enemy
With all them dreadnoughts and submarines
Came a-rippin' across the sea.

VIII

An' he thought of the army he wished he had,
An' he reckoned up his navy.
"I guess I've set here long enough;
I'll have to get busy," sez'ee.
But the last I saw he was a-settin' there yit
An' strokin' his long goatee.

IX

It ain't no time to be settin' 'round,
I kin tell ye—no sirree.
He better be gittin' up and out o' that cheer
An' git outdoors and see,
An' do his chores and fix things up
The way they oughter be.

X

He might be helpin' them cousins o' his'n
To fight fer liberty,
An' he might git in a few licks hisself
Jes' fer humanity.
Anyhow, I wish he'd quit jinglin' them coins
An' thankin' God fer the sea.

MORE LAND FOR NATIONAL FORESTS

THE National Forest Reservation Commission has approved the purchase by the Government of 47,600 acres of land, comprising sixty-one tracts in the Appalachian and White Mountains. Approximately 25,000 acres of this lies in the western part of Maine, contiguous to the Government's previous purchases in New Hampshire, and is the first land to be acquired in the State of Maine for National Forest purposes. More than 300,000 acres have now been acquired in the White Mountains in New Hampshire and Maine, the area acquired and approved for purchase being almost one-half of the total area which it is expected that the Government will acquire in the principal White Mountain region.

Additional tracts were also acquired in the Southern Appalachian States. In Macon and McDowell Counties, North Carolina, a number of small tracts were acquired which together comprise 2,060 acres. In Virginia, the purchases were mostly in Shenandoah, Amherst, Augusta and Rockbridge Counties, where additional acreage amounting to 7,300 acres was acquired. Some 3,000 acres of the new lands are situated in Polk, Carter and Unicoi Counties, Tennessee, while in Rabun and Fannin Counties, Georgia, about 1,100 acres were acquired and, in Oconee County, South Carolina, 300 acres.

Unless provision is made by this Congress for additional funds the work of purchasing additional areas cannot be continued. In order to keep the machinery intact and to make reasonable progress it is essential that at least one million dollars be available for the fiscal year 1917, and two million dollars for the fiscal year 1918. It is understood that proposals have been made in the Senate to include an item appropriating these sums in the agricultural appropriation act for the fiscal year 1917 when it is under consideration by that body.

CORRESPONDENCE COURSE IN FORESTRY

ONE of the methods used by State Agricultural Colleges for carrying information to the people is the correspondence course. By many it is considered one of the most effective employed. Thousands of people are reached every year in this way. These courses cover a wide range of subjects relating to agriculture. They are written in a simple manner and frequently revised in order that they will contain the latest ideas and information on each subject. The object in issuing information in this way rather than in bulletin form is to make sure that the information sent is carefully read. The correspondence courses are divided into short lessons, each covering a particular subject or problem. Together with each lesson is sent a question paper relating to the text. To answer these questions it is necessary that the text be carefully read. The next lesson in a course is not sent until the questions relating to the previous lesson are answered satisfactorily and returned to the college.

In the fall of 1914 a correspondence course in Farm Forestry was issued by the Pennsylvania State College. It has proven one of the most popular courses issued. The first edition of five hundred copies was exhausted within a year. It showed that farmers are interested in the care of their woodlots and eager to secure knowledge as to how woodlots can best be managed. Some of the subjects discussed in the different lessons are:

The tree, its parts and their uses, the factors influencing the life of trees, starting a woodlot from seed or by planting, how to care for a forest plantation, managing the ordinary farm woodlot, woodlot protection, and estimating the woodlot for lumber and cordwood.

Many of the questions asked in the lessons refer directly to the farm woodlot itself, making it necessary in answering them to visit a woodlot for observation or for taking measurements. Those taking the course in farm forestry are encouraged and urged to ask questions in return, relating to the particular problems they find in their own woodlot.

FOREST CLUBS MEET

THE second annual meeting of the Intercollegiate Association of Forestry Clubs was held at Ann Arbor, Mich., recently. The association was formed at Ithaca, N. Y., in 1914, at the time of the conference of forestry schools held in connection with the dedication of the new forestry building, the object of the association being to create interest in scientific forestry and to promote good fellowship among the forestry students at different schools.

At the meeting held this year the delegates met in business session and were entertained at a banquet given in their honor by the Forestry Club of the University of Michigan. Included in the business transacted was a complete revision of the preliminary constitution drawn

up at Ithaca, N. Y., in 1914, and the election of the president school for the ensuing year. The University of Washington was chosen as president school to succeed Cornell University.

The Forestry Clubs of the following universities were represented by delegates at the meeting: Cornell University, president school, M. B. Haman; University of California, A. E. Wieslander; Michigan Agricultural College, E. Hamlin; University of Michigan, O. L. Lovejoy; Ohio State University, J. D. Sayre; Syracuse University, J. I. Neasmith; University of Washington, D. H. Clark; Yale University, G. H. Lentz. The Universities of Idaho and Montana were represented by proxy.

The phrase "of United States" was struck out because the clubs of forestry schools in Canada have been invited to join the association.

IN CHARGE OF YOSEMITE

SECRETARY LANE has announced the appointment of Washington B. Lewis as supervisor of the Yosemite National Park, California. Mr. Lewis graduated from the Engineering Department of the University of Michigan in 1907 and since that time has been a member of the United States Geological Survey. During the past nine years, in addition to work done in several of the Western States, he was furloughed for survey work with the First and Second National Geographic Society expeditions to Alaska, and, in 1911, went to Argentina where he was engaged for four years in making studies and surveys in connection with the investigation of the industrial possibilities of northern Patagonia for the government of Argentina.

Mr. Lewis is an associate member of the American Society of Civil Engineers and a member of the Cosmos Club of Washington, D. C.

CHANGES AT WYMAN'S SCHOOL

WYMAN'S School of the Woods at Munising, Michigan, has filled the vacancy in its teaching staff by the appointment of Raymond J. Guyer, a graduate of Pennsylvania State College, and by the further addition of R. R. Fenska, who finished at Yale. Some few changes have been made in the course to bring about even greater practical training. The school will continue to place Forest Engineering and Logging and Milling in the lead with the technical forestry subjects and constant practical demonstration and work as a filler for the two practical subjects.

BIRD AND TREE BOOKS FREE

Members have an unusual opportunity to acquire valuable bird and tree books without any charge. All that it is necessary to do is to secure one new subscribing member. See the announcement at the bottom of the table of contents on the first page of this issue.

Editorial

AGRICULTURAL COMMITTEE'S SURPRISING ACTION

THE Agricultural Committee of the House of Representatives, by a vote of eight to seven, struck out of the appropriation bill the sum of \$3,000,000 for continuing the work of land purchases under the Weeks Law. If this action stands, the policy of acquisition of mountainous area in the Appalachians and White Mountains by the National Government will come to an abrupt termination, and the government will be left with the nucleus of seventeen administrative areas, each requiring supervision and protection, but none large enough to effectively accomplish the purposes for which they were intended.

This action is the more surprising when it is known that this sum represents the amount previously appropriated by Congress, but which lapsed by time limitation because the Government refused to be hurried into unwise or ill-considered purchases previous to creating the proper machinery for appraisal and the perfection of titles.

Congress cannot plead failure for this work as a reason for its discontinuance. At the recent hearing before the Agricultural Committee all sections were represented here, and the demand for its continuance was unanimous. No breath of criticism attaches to the purchases. The areas already acquired, totalling 404,984 acres, though scattered and small, have been wisely grouped in definite districts in which it will be possible with continued appropriations to secure tracts large enough to permit of economical and effective fire protection. Already these tracts have been brought under control, fires stopped, trails, lookouts and telephones installed and the mountaineers educated to a new attitude towards the care of the

forests. 874,498 acres have been approved for purchase and if secured would make the total acquired 1,279,482 acres. This work, pushed forward, means the regeneration of vast areas, not merely through forest restoration, but by a distinct uplift in social conditions as well. The physical benefits will not be confined to the mountain counties within which the lands lie, but by effective watershed protection stream flow will be regulated, power sites will increase in value, navigation will be protected, erosion and silting up of streams retarded or prevented and the entire economic life of the States affected will be permanently bettered.

There is yet time to save this appropriation. Senator Gallinger has introduced in the Senate an amendment to the Agricultural Appropriation bill. This amendment was referred to the Committee on Agriculture and Forestry, Senator Gore, chairman. It is hoped this committee will report favorably on the amendment and that it will be adopted by the Senate. If it is it will go to conferees of the Senate and the House and will finally get back into the House for a vote.

It is essential that every Senator be petitioned to give the amendment his consideration and approval. The American Forestry Association has already requested such consideration from each one. Members of the Association are now asked to personally write to each Senator and each Representative from their district urging support of the measure. Such personal letters will have considerable weight and will be invaluable in the effort to secure the appropriation.

Please write now.

Waterpower Legislation

BY H. H. CHAPMAN

THE development of public utilities in this country is largely in private hands, as contrasted with almost universal public ownership in Europe. In its initial stages of development, American communities were more keenly alive to the benefits of these enterprises than to the rights inherent in the public. The ground lost by perpetual franchises and other onerous conditions, often obtained by bribery, is only recently being partially recovered by means of limited franchises, profit sharing and the right of recapture and public operation at expiration of leases.

The prolonged agitation over waterpower legislation is explained by the development of waterpower, through

long-distance transmission, as a public utility of the first magnitude, furnishing power, not only to public service corporations engaged in transportation, lighting and heating, but to the manufacturing industries and even promising to invade the homes as a substitute for fuel. Railroads in mountain districts may in the near future be operated entirely by electricity. The enormous importance of this development of waterpower as a public utility cannot be minimized.

Waterpower development tends naturally towards monopolistic control. A power site is capable of development by but one corporation. Immense sums are required for long periods to install the dams, power plants and

distributing systems, and to create and maintain a profitable and economically administered power business. The consolidation of many waterpower sites in a few strong hands cannot be successfully prevented, any more than that of the development of large and efficient railroad systems.

But this very tendency carries with it, as in all other instances of monopoly, the danger that the public may eventually be forced to pay tribute by overcharges for services which have become indispensable. The specific means by which this might occur are monopolistic control of all available waterpower sites, with the ability to limit developments and raise rates; and the inflation of the capitalized value of the corporation's business by which the per cent earned upon the watered capital ceases to indicate the returns upon the capital actually invested. The legality of inflated values is accomplished through sales, and consolidations or reorganizations by which the plants are actually transferred at the advanced values, which then become the basis for rate charges.

Short of enforcing competition, which is not always economically sound, the public can protect itself in three ways—by the regulation of rates, based on fair earnings; by restricting overcapitalization, and by preventing the monopoly of the natural resource, making development a condition of control.

Good waterpower legislation must make possible the development of publicly-owned power sites, but must rigidly prevent the acquisition of rights under leases which do not require development. If market conditions do not demand the use of a waterpower, control of the site should remain in public hands for the present. The public must not be left with the husk of ownership, similar, for instance, to that possessed under 999-year leases. The right of recapture of these sites must be protected, and the terms must be such as to exclude the value of the rights granted and of public property or land used, as well as intangible values based on income. The principle should be to return to the lessee his actual capital investment, but not to sanction the very process of inflation of values which it is the principal object of public ownership to prevent. This same inflation should be checked by power to withhold consent to sales or transfer of lease, except upon terms approved by the public official responsible for the administration. The above objects may be best attained through the retention of practical or actual public ownership of waterpower sites.

The third object, regulation of rates charged for services, may be exercised by States or for interstate business by the national government. This power alone forms an entirely inadequate control of the situation, since it does not prevent inflation nor require development, as indicated by the government report reviewed on page 236 of this issue.

The Ferris Waterpower Bill, as passed by the House of Representatives, provided adequate measures for development of waterpower sites on public lands under proper control. As amended by the Senate, this bill

1. Permits the acquisition of leases controlling unlimited waterpower sites by the same corporation without requiring prompt development.

2. Prevents States, municipalities or other public bodies acquiring these sites, even at the expiration of the lease, unless at the option of the lessee.

3. Permits inflation of capital by removing all control over transfer of leases, and failing to properly safeguard the provisions of recapture.

These alterations work, in effect, to rob the public of the substance of ownership and to make the lessee to all intents and purposes the owner. This course is justified by its advocates on the ground that capital requires these guarantees as a condition making possible the financing of the projects. But the statistics of actual development cited on page 236 show that under present regulations, which grant none of these "rights of ownership," 56 per cent of *all* western waterpowers are now being operated, with an equal amount in process of development or under application.

This means that the financial interests which are at present capable of developing public waterpower sites are also capable of operating under the conditions now imposed, and which thoroughly protect the public at all points. Unless the amended Ferris Bill sanctions regulations equally efficient, it should be summarily disposed of. In its present form it is unfit for passage.

The bill contains two further features, both objectionable. In the interest of an organization of promoters, it would sanction a commercial power site in the Grand Canyon of Arizona, known as one of the wonders of the world. As well permit the harnessing of the geysers in Yellowstone Park. The second feature, which we are at a loss to account for, is the provision transferring the administration of the waterpower sites situated within National Forests from the Forest Service to the Secretary of the Interior. The entire policy of leasing and use of waterpower had its origin and was developed to an efficient practice in the Forest Service.

Three-fourths of all the waterpowers in use on public lands are now handled by Forest Service officials, and a still larger percentage of the unused power lies within these national forests. These sites are situated hundreds of miles from any existing Interior Department lands or officials. Expensive and useless duplication of work would result—with no attendant benefits. Any such wholesale transfers must be justified either on the grounds of incompetency of existing service, or a large resultant saving and increased efficiency. This feature of the Ferris Bill is absolutely unjustified by existing conditions.

EXHIBITS WIN DIPLOMA

EXHIBITS sent to the Panama-Pacific Exposition, at San Francisco, by the State College of Forestry, Syracuse University, have been returned to the college and are being unpacked. The models, showing the practical work done at the college, won a diploma.

Canadian Department

BY ELLWOOD WILSON

Secretary Canadian Society of Forest Engineers

P. Z. Caverhill, Director of Forest Survey of the Province of New Brunswick, has commenced his important work of mapping and estimating the timber lands of that Province. Mr. Caverhill is attacking this problem in a very practical and thorough manner and his results will be looked forward to with much interest.

The Canadian Forestry Association has brought out a very well gotten up "Boy Scouts' Book" which gives information about the forests, their use and protection, which every boy should know, and is now engaged in drawing up a set of examination questions which will entitle a scout, after answering them successfully, to his "Forest Badge."

J. F. L. Hughes, a student member of the Canadian Society of Forest Engineers, and formerly with the Laurentide Company, has been taking a course in aviation and is now on his way to England to continue his training.

A letter recently received from Mr. Stuart, formerly with the Laurentide Company, says that he has been eleven months in the trenches near Ypres after spending some time at Shornecliffe. He says the mud is terrible, but that otherwise there is less hardship in the trenches than on a forestry survey in the Canadian woods. He is one of five sergeants left out of an original sixty.

George H. Mead, of Dayton, Ohio, has been elected President of the Spanish River Pulp and Paper Company.

Letters recently received from foresters in Spain and Sweden complain that American writers do not use the scientific names of trees and plants, but only the common names, which are of course unintelligible to them. The scientific names should be used much more freely than they are at present.

The Commission of Conservation has just issued a book, "Altitudes in Canada," compiled by Mr. James White, which gives the altitudes above sea level of all the most important places in the Dominion. This represents a large amount of work, and Mr. White is to be congratulated on preparing a work which will be very useful.

The annual meeting and banquet of the St. Maurice Forest Protective Association was held at the Place Viger Hotel, Montreal, recently. This was a very successful meeting and the Association showed that it had progressed during the past year.

An appropriation was made for building telephone lines to connect some of the lookout towers erected last year and to make other permanent improvements. A committee was appointed to draw up a form of order to be issued by all the members to their foremen in charge of woods operations, giving them instructions about fighting fires, reporting them, guarding against fires set by smokers and smudges and by men coming into and going out of the forest. The following officers were elected: President, Ellwood Wilson, Laurentide Company, Ltd.; vice-president, R. E. Grant, St. Maurice Lumber Company; Henry Sorgius, manager and secretary.

The annual meeting of the Canadian Pulp and Paper Association was held at the Ritz-Carlton Hotel in Montreal and was a great success. The paper business was reported to be in a flourishing condition and everyone was pleased with what had been accomplished through cooperation. Mr. J. H. A. Acer, of the Laurentide Company, Ltd., was elected president. The technical section meeting was very interesting, one of the papers on welfare work among mill employes being especially so.

The Canadian Pacific Railway will begin the planting of trees along their eastern lines to take the place of the snow fences at present in use. This has already been done on western lines with success.

The Geo. A. Fuller Co., Ltd., of Montreal, have obtained a contract to build three mills for the St. Maurice Paper Company, Ltd., at Cap Magdalaine, Que. This company is a subsidiary of the Union Bag and Paper Company, of Hudson Falls, N. Y.

The Crown Lands Department, of Nova Scotia, reports about 13,000 acres burned over during the season of 1915.

An article published in the *Canadian Pulp and Paper Magazine* of March 1, written by Mr. R. H. McKee, head of the Pulp & Paper School, of the University of Maine, about the possibility of obtaining hybrid poplar trees which will grow very much faster than the present species, opens up a most interesting field for experiment. If hybrid trees can be obtained which will produce pulp wood in ten to twenty years the industry would be placed on a new and absolutely firm basis, with raw material which would be much cheaper, and which, being produced right at the mills, would greatly reduce the present cost of transportation. It is hoped that experiments along this line will be undertaken at once.

The bill to amend the forest fire laws of Quebec has passed third reading.

The annual meeting of Mountain Lumbermen was held at Nelson, B. C., and reports showed that the outlook was better than for some years. Mr. C. D. McNab, was elected president; Mr. A. J. Lammar, vice-president, and Mr. I. R. Poole, secretary-treasurer.

Lieut. Jos. Power, son of Mr. Wm. Power, past president of the Canadian Forestry Association, has returned from nine months spent in the trenches in Flanders, with nerves shattered. He spent two months in the hospital in London and has two months leave. His brother, Lieut. Charles Power, is in hospital with eighteen shrapnel wounds.

The report of the Conservation Commission, "Forest Protection in Canada, 1913-14," has just been issued and is a very interesting volume.

The 215-foot flag pole made of Douglas fir, *Pseudotsuga mucronata*, Sudw., recently shipped from British Columbia to Kew Gardens, London, Eng., arrived safely. A London dispatch, referring to its arrival, says: "Once the pride of a British Columbia forest, a 215-foot flag staff now lies in the Thames off Kew Gardens." The clerk at Kew wrote out a receipt for 215 feet of flag pole, on a two-inch piece of paper: "Received in good condition, one log." The adventures of the pole are by no means at an end. The Garden authorities are now faced with the big task of raising it across the moat which bounds the river front of the Gardens and then dragging it a quarter of a mile to the mound where the old pole stood for so many years.

The Lower Ottawa Forest Protective Association increased its area by 944,640 acres during 1915 and now patrols 8,504,320 acres. 155 fires were extinguished, and of these 113 were put out without extra labor by the ranger. 322 permits were issued for burning slashings, and these fires were supervised by the rangers.

Timber is becoming so scarce in England and high freights and scarcity of ships have rendered the situation so acute, that the War Office has asked the Canadian Government to enlist a battalion of woodsmen to cut timber in England. Recruiting will start at once. Lt. Col. Alex. McDougall, of Ottawa, will be in command.

Mr. J. B. Tyrrell, F. G. S., has written, for the February number of the *Canadian Forestry Journal*, a very interesting account of the District of Paricia, a section of 150,000 square miles to the northwest of the Province of Ontario which has just been given to that Province by the Dominion Government. It has a population of 3,000 Indians, nine whites, and will cut about two cords of wood per acre.

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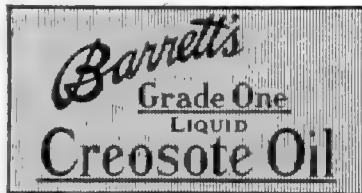
RAILROADS have adopted creosoted ties; cities recognize creosoted wood block as the highest type of pavement; the Department of Agriculture urges the wider use of wood preservatives. Yet, creosoted wood, with all its advantages, has generally been out of the reach of ordinary timber users.

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Percy Burchill, of Nelson, N. B., a member of the lumbering firm of Burchill & Son, and a graduate in forestry of the class of 1910, U. N. B., was married on January 26, at St. John, N. B., to Miss Gene Garden, a graduate of the same institution.

B. M. Winegar, of the C. P. R. Forestry staff, was in Fredericton on March 2, having a conference regarding fire patrol on their lines with Colonel Loggie, provincial forester, P. Z. Caverhill, and John McGibbon, chief fire warden for New Brunswick.

As part of the spring field work along construction lines, it is proposed to build a telephone line to the camp, a distance of about three miles, and also to construct some trails and possibly some lookout stations on the college lands. Besides giving the students some very practical experience, the proposed improvements will have considerable value in fire protection.

W. W. Gleason, formerly with Wyman's School of the Woods, Munising, Mich., is now a special agent for the St. George Pulp and Paper Company, at St. George, N. B.

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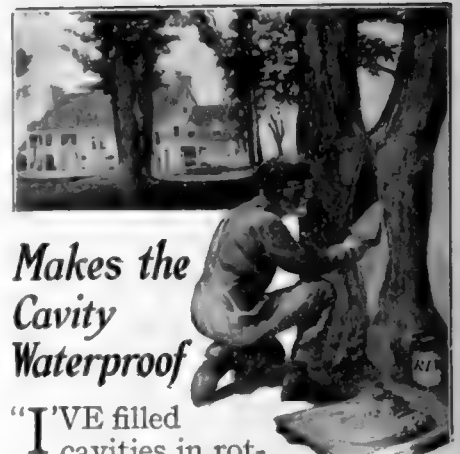
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CASCADE NATIONAL FOREST, OREGON

Winberry Creek Area 7,320 Acres

Douglas fir.....	445,000,000	bd. ft.
Western hemlock..	25,000,000	" "
Western red cedar.	10,000,000	" "
Incense cedar, white and amabilis fir..	250,000	" "

Total estimate, 480,250,000 " "

This chance contains timber of large size and high quality.

COLUMBIA NATIONAL FOREST, WASHINGTON

Little White Salmon River Area 6,095 Acres

Douglas fir.....	89,250,000	bd. ft.
Western red cedar.	13,150,000	" "
Western hemlock..	9,450,000	" "
White pine.....	1,450,000	" "
White fir.....	950,000	" "
Noble fir.....	900,000	" "

Total estimate, 115,150,000 " "

SANTIAM NATIONAL FOREST, OREGON

Breitenbruch River Area 5,950 Acres

Douglas fir.....	183,260,000	bd. ft.
Western hemlock..	53,300,000	" "
Western red cedar.	4,600,000	" "
Amabilis fir.....	3,950,000	" "
W. white pine....	2,900,000	" "
Sugar pine.....	650,000	" "
Noble fir.....	1,390,000	" "
Yellow cypress....	140,000	" "
Mountain hemlock,	700,000	" "

Total estimate, 250,890,000 " "

Detailed information about these and other National Forest logging chances in Oregon and Washington will be furnished upon request by the District Forester, Portland, Ore.

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North Carolina Pine Manufacturers Association,
Norfolk, Va.
North Carolina pine.

Southern Cypress Manufacturers Association,
New Orleans, La.
Cypress, tupelo.

Southern Pine Association,
New Orleans, La.
Southern yellow pine.

West Coast Lumbermen's Association,
Seattle, Wash.
Douglas fir, Western red cedar, spruce, hemlock.

Western Pine Manufacturers Association,
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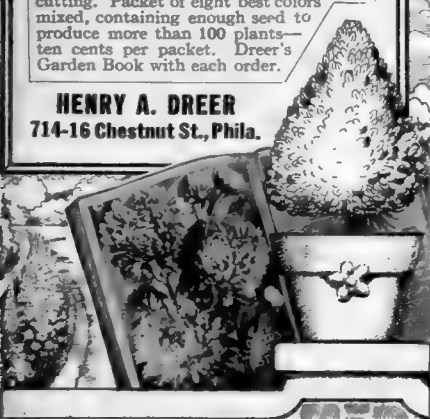
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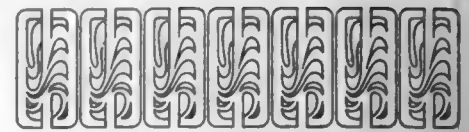
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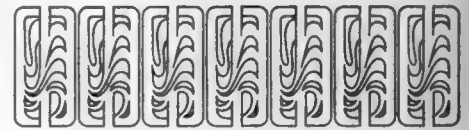


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American Forestry

Vol. 22

MAY, 1916

No. 269



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THE AMERICAN ELM



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AMERICAN FORESTRY

The Magazine of the American Forestry Association

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May, 1916. Vol. 22

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American Forestry

VOL. XXII

MAY, 1916

No. 269

The American Elm

(*Ulmus americana*)

BY SAMUEL B. DETWILER.

"Wise with the lore of centuries,
What tales, if there were tongues in trees,
That giant elm could tell."

Of all our shade trees, the American elm is the most aristocratic; wherever it is seen it produces the impression of dignity and courtliness. Michaux, the great botanist, commended it as "the most magnificent vegetable of the temperate zone." It is fitting that beneath a noble elm, at Cambridge, Mass., Gen. Washington

in America, Great Britain, Ireland, Corsica, or where-soever they may be dispersed throughout the world, dedicate this tree of liberty. May all our counsels and deliberations, under its venerable branches, be guided by wisdom and directed for the support and maintenance of that liberty which our forefathers sought out and found under the trees in the wilderness; may it long flourish, and may the sons of liberty often repair hither to confirm and strengthen each other. When they look toward this sacred elm may they be penetrated with a sense of their duty to themselves and their posterity, and may they, like the house of David, grow stronger, while their enemies, like the house of Saul, shall grow weaker and weaker.—Amen."

In England it was customary for the people to gather under an elm on the village green to debate public questions. Memories of home probably inspired the early settlers of New England to plant elms in their dooryards and on the village greens, and today these elms and



AREA OF GROWTH OF AMERICAN ELM

took command of the Continental Army; it is equally in character that William Penn made his solemn compact with the Indians in the shade of a great elm at Shackamaxon, on the banks of the Delaware. Voltaire refers to this agreement as "the only treaty never sworn to and never broken." Although the Treaty Elm was destroyed by a storm more than a century ago and only a monument now marks the site, the tree has been immortalized in the famous painting by Benjamin West.

Before the days of the American Revolution American elms were selected for planting as symbols of liberty; the most famous Liberty Trees were in Boston, Providence, Newport and New York. The Liberty Elm at Providence, R. I., stood in Olney's Lane, and was dedicated to the "Sons of Liberty" on July 25, 1768, before a great gathering of people, in the following words: "We do, in the name and behalf of all true sons of liberty



LEAF BUDS AND FLOWERS OF THE AMERICAN ELM

The leaves are from 4 to 6 inches long, thick, rough, unequally based, acute at the apex and doubly toothed on the margin. The flowers occur in three or four flowered clusters on drooping stalks about one inch long; the buds are reddish-brown, the leaf buds are smaller than the flower buds and are located toward the end of the twig. The flower buds are larger and are located along side of twig.

their successors have become the most valued ornamental feature of the New England landscape. An invading army of pests threaten the existence of these cherished trees, but a determined fight is being made to save them.

The American elm is a tree that well deserves first place in the list of our ornamental trees. It is even more beautiful in winter than summer, unless, perchance, some misguided individual has attempted to improve on nature



THE PALM LEAF FORM OF ELM

The one-sided character of this tree is not well seen in a photograph, but the name describes it well; it is just like a huge palm leaf fan. This variety of the elm must be seen in the field to be thoroughly appreciated.

by pruning it and has thus marred its natural symmetry of form. When the elm grows all its life in the open it has a broad, rounded top, occasionally shaped like that of an oak, but with more gracefully extended limbs. One of the most common and striking forms has a vase-shaped top. The trunk rises, a single shaft, for many feet above the ground and then separates into several large branches, which sweep upward and outward into wide arches and terminate in masses of slender drooping twigs. Very rarely the top is umbrella-shaped, the trunk remaining entire nearly to the full height of the tree, and then abruptly branching into a wide arch, fringed by long drooping branchlets. With a shorter trunk an elm of this type with its pendant sprays sweeping nearly to the ground rivals the weeping willow in grace. Sometimes the branches are stiffer, the long, straight trunk is feathered with short branches and the top resembles a beautiful plume. If it is desirable to plant an American elm that will develop any particular form of top, elm seedlings should be grafted with scions from a tree of the type desired.

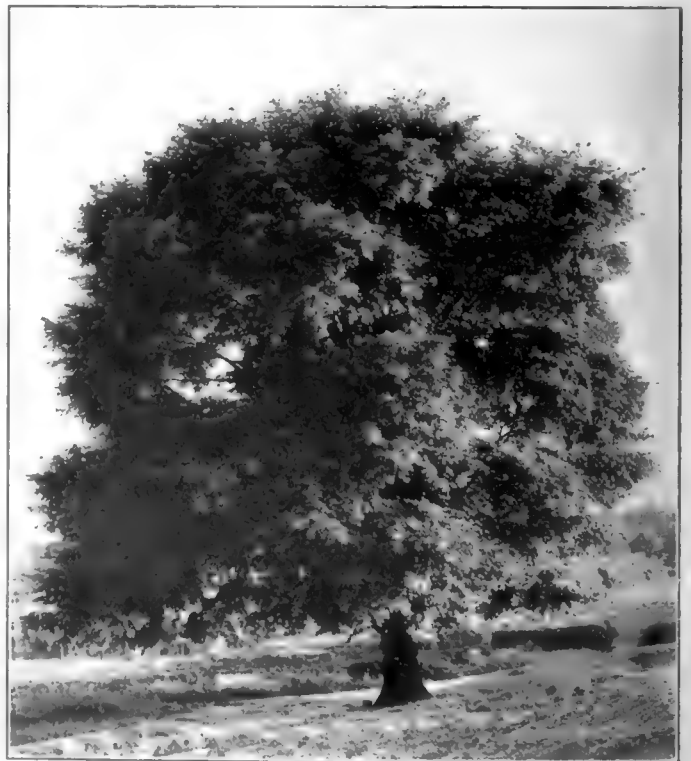
The American elm is not only picturesque, but is also a large and useful lumber tree. In the forest it holds its head aloft on a clean, straight trunk. Its medium-sized flattened top is composed of many heavy twisted

branches. The usual size is 2 to 4 feet in diameter and 80 to 100 feet in height, but elms 8 to 11 feet in diameter and 120 to 140 feet high have been known. One of the largest American elms on record was the Hatfield Elm, in Massachusetts, which had a circumference of 34 feet at a point 3 feet above the ground.

The elms belong to the nettle family, and about fifteen species are known in the world, most of which are trees. Six species are native to North America. The American elm is commonly known as white elm and sometimes as gray elm or water elm. It is found growing native from Newfoundland across Canada to the Rocky Mountains and south to Florida and Texas. Few of our trees have a wider distribution. Associated with it in portions of its range are the slippery or red elm, the cork or rock elm, and the winged elm or wahoo. The English elm has also been planted in the eastern United States to a limited extent.

The American elm is so well known that it requires little description. The bark of the trunk is rather thick and rough, dark gray in color, irregularly furrowed into wide, flat, firm ridges. The ridges are sometimes covered with flaky scales, or, on old trees, with corky plates, that give the trunk a somewhat shaggy appearance.

The twigs at first are greenish and covered with down,



THE OAK TREE TYPE OF ELM

In this type is seen all the sturdy dignity of the oak, which it greatly resembles. The tree is not, however, of frequent occurrence.

later they are smooth reddish-brown. Older branches have ashy, gray bark. The symmetrical development of the elm top is due to the regularity with which the branches divide and subdivide by forking. The twigs of the American elm are readily recognized from those of the slippery elm by their lack of the mucilaginous inner

bark, which characterizes the latter. The twigs of the cork elm have irregular corky ridges; twigs of the winged elm also develop corky ridges which are wide and much flattened.

The leaf buds are small, sharp-pointed, usually smooth and covered with six to ten overlapping reddish-brown scales. The flower buds are larger than the leaf buds, somewhat flattened and farther from the end of the twig than the leaf buds. The buds of slippery elm are easily told from those of white elm because they are larger and coated with an abundance of golden-brown hairs.

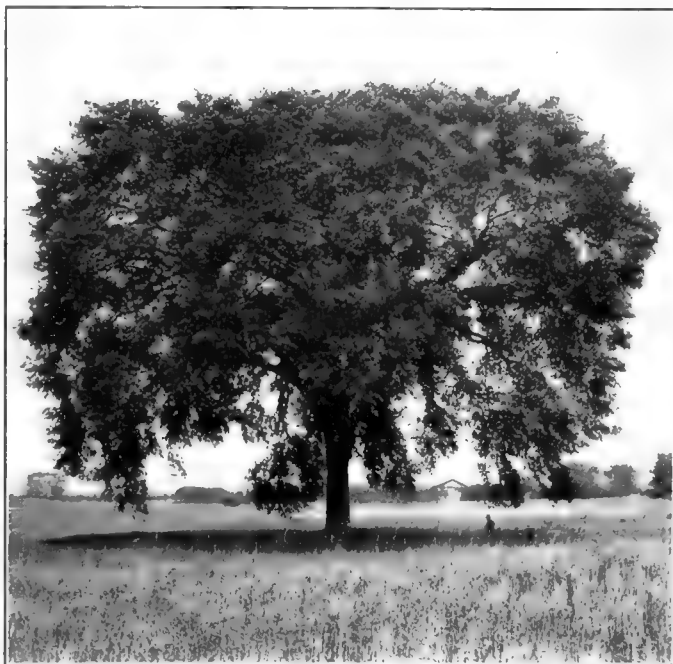


Photograph by C. C. Laney.

THE VASE TYPE OF ELM

This tree, which is on the Latta Road near Charlotte, N. Y., is known by the residents in that vicinity as the "Golden Rod" and the "Boquet." Frequently the vase type of elm is feathered, as is this tree, but elms of other forms are also feathered, the small branches on the trunk growing nearly to the ground. The effect thus produced is very pleasing.

The leaves are spaced singly on the branches. When they first come out of the bud they are folded like little fans; when full grown they are 2 to 5 inches long, 2 to 3 inches wide, sharp-pointed, with prominent, evenly spaced veins that run straight from the midrib to the saw-like edges. The upper surface of the white elm leaf is fairly smooth to the touch; that of the slippery elm is rough whichever way it is rubbed. The two halves of the elm leaf blade are unequal at the base. It is interesting to study the arrangement of elm leaves on the branches in the summer. It will be seen that the leaves are so shaped as to fit closely to the branch and each leaf in relation to the others stands so that all receive full benefit from the sunlight which they require to elaborate the food of the tree.



ONE TYPE OF AMERICAN ELM

This is known as the low-headed form of the willow type. Note the flat spread and compare it with the other forms of this well-known and well-liked tree.

The flowers of the white elm appear in March or April before the leaves, and are among the first heralds of the coming spring. They are perfect, that is, each flower has the pollen-forming and seed-forming elements, but they are so small and so inconspicuous in color and size that they may be mistaken for unfolding buds. The fruits (samaras) ripen before the leaves have fully developed and themselves look like tiny, oval leaves. The seed is small and flat and surrounded on all sides by a wing which is deeply notched at the tip and the margin of the wing is fringed with hairs.

The wood of the American elm is heavy, hard and strong. Because of its interlacing fibers the wood is very



A RARE FORM OF AMERICAN ELM

It is not often that this form of the elm is found.



AMERICAN ELM IN WINTER

It is easy to identify the elm in winter. This is the winter form of the feathered type of the white or American elm.

difficult to split. Oliver Wendell Holmes graphically describes this quality of elm wood in "The Wonderful One-Hoss Shay:"

"The hubs of logs from the settler's ellum,
Last of its timber—they couldn't sell 'em;
Never an axe had seen their chips,
And the wedges flew from between their lips,
Their blunt ends frizzled like celery tips."

Commercial Uses of the White Elm

THOUGH the white elm has long been held in esteem as an ornament, it has been in use a still longer time. In some regions, in early times, the bark was more valuable than the wood, because it could be stripped from the trunk during most of the year and could be separated into strands of which cordage was made. The Iroquois Indians in western New York were able to make serviceable canoes of elm bark. Such canoes were all one piece, not many pieces sewed together, as when canoes were made of birch bark. An elm trunk 20 feet or more in length was peeled, the

The wood of the elm is easily recognized by the peculiar wavy arrangement of the fibers when a smooth cut is made across the ring of annual growth.

American elm grows in almost any soil but prefers deep rich loam. It has been little used in planting for forestry purposes. But in reforesting soils too wet for farming it will undoubtedly prove valuable in many localities. Young elms sometimes grow an inch in diameter in two or three years, but ten or twelve years to an inch is nearer the average growth. As an ornamental and street tree the American elm is unsurpassed, but it is subject to so many insect enemies that it cannot be recommended for planting in New England. It is a favorite food of the gypsy moth, leopard moth, brown-tail moth, and the elm-leaf beetle is its special destructive pest. The beetle and its larvae feed on the elm leaves from May to August, and by preventing the growth of new foliage, exhaust and kill the tree. The remedy is to spray liberally with an arsenical solution as soon as the insect begins its work, and spray again after a ten days' interval, to destroy young larvae that hatch after first application.

On account of the toughness of its wood it is little injured by storms, but in a smoky atmosphere this tree does not thrive because its leaf surfaces become thickly coated with soot. Because of its fibrous, shallow root system, the elm is easily transplanted and even very large trees may be successfully moved. The roots run out to a great distance from the tree and will clog the drain pipes if the joints of the pipes are not thoroughly closed.

Too little attention is given to arousing public interest in the splendid elms or other notable trees which exist in most localities. Trees prized because of large size, perfect form or historical associations should be known and enjoyed by all, and should be carefully preserved for the benefit of future generations. Passers-by would be glad to know the life-stories of famous trees, and public-spirited citizens and associations might well make systematic efforts to have appropriate tablets erected, giving the history of every noted tree in the community.

bark turned inside out, the ends rolled up and tied, the central part spread wide and secured by thwarts, and the canoe was ready for service. It is recorded that Captain Blacksnake (an Indian) once visited Pittsburg in such a canoe which he made on the head of the Allegheny River; and Peter Kalm long before that described the process by which the Mohawk Indians made them.

Ropes of elm bark appear to have been in pretty general use. They were common in New England, New York, and North Carolina. With such ropes the Indians dragged their canoes, tied their tent poles, hung up

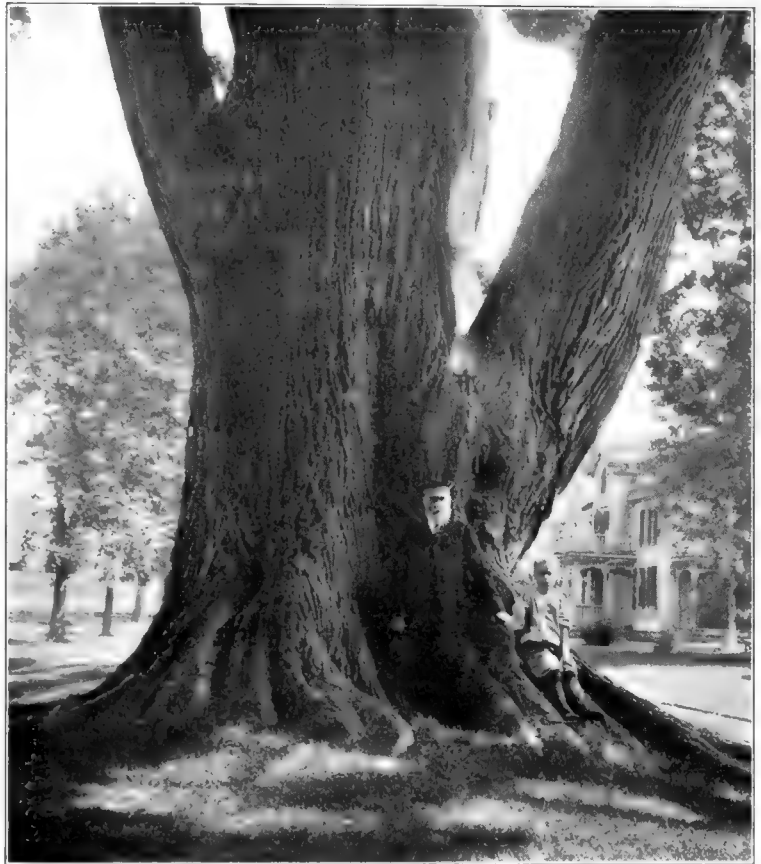
their fresh game, and trussed up their luggage when on the hike. In the south, strands of the bark (also of wing elm) were used in bagging cotton, and thin strands were sometimes employed in bottoming chairs. It was woven into large, coarse baskets for use about the farms, but such baskets were not good for as much wear as baskets made of hickory or oak splits.

SHIPS AND BOATS

The English who settled in New England were constantly on the lookout for ship timber. There was abundance of white pine for masts, but hardwoods for ribs and planking were needed, and elm was one of the earliest of American woods to be given a trial. Shipbuilders in Maine appear to have been the first to use it for keels. It stood strains and shocks remarkably well and offered reasonable resistance to decay. It was tried near the same time for piling, and it is so used to this day. It stands the pounding of waves and resists the impact of vessels snubbing up to piers.

The wood enters into boat building, from the longest ship down to the canoe where its place is the bottom board laid inside, on which occupants stand and walk. Barge builders use it in practically all parts of those huge clumsy vessels. It is recommended by its toughness and strength, and also by its wearing qualities.

It was one of the early exports to England where the builders of ships used it for gunwales, garboards, slips, grating, fenders, planking, ladders and the lining of the



THE WEATHERSFIELD, CONNECTICUT, ELM

It is claimed that this is the largest elm in Connecticut. Its circumference is 27 feet 1 inch; its spread 142 feet 8½ inches and it is about 175 years old.

vessels. It was employed for similar purposes by shipbuilders in this country. It was sometimes laid for decks but objection was urged against it because it became rough, and was sometimes inclined to rise in splinters. One of the properties which made it popular was its whiteness. No matter how stained and foul it became, a vigorous application of soap, sand, water, and the scrub brush made it white. That quality is said to have given it the name white elm in the shipyards, but the light color of the bark appears to have been responsible for the name in other regions. The whiteness of the wood, after an application of the scrubbing brush, is still appreciated, not only among boat builders but by makers of refrigerators and cold storage plants where unpainted woods must be used and it is desirable to keep them clean and attractive.



THE BENEDICT ELM

This elm is in Wilton township, Fairfield County, Conn., its circumference is 14 feet 11¼ inches; and its spread is about 105 feet. It was photographed and measured by Norman De W. Betts.

An examination of detailed reports of boat building in the principal states where that industry is carried on shows that

white elm is employed in small quantities only. It is probable, therefore, that the wood was more important in boat and ship building a century or more ago than it is now.

COOPERAGE

White elm is one of the most important slack cooperage woods of this country and it has long held that place.



THE JUDD ELM

This elm on West Main Street, New Britain, Conn., was planted by Morton Judd in 1822 and the bronze tablet on it notes the fact. About 5 feet from the ground it measures 10 feet 10½ inches in circumference and its spread is 105 feet. A nephew of Morton Judd occupies the house in front of which the tree is planted.

Vessels belonging in this class of cooperage are intended for commodities other than liquids, and the number of such commodities is very large. Flour, sugar, and cement are among the most important. Formerly flour barrels were made of red oak to the exclusion of most other woods. Then cottonwood came into use in regions where it was abundant, but white elm later became the prevailing material, and it still holds that place, but is manufactured into barrels of many other kinds. It meets practically every requirement of the slack cooperage industry. It is tough, light, cheap, and possesses the necessary strength. The wood is easy to season and is not difficult to work. It is employed not only as staves but also as heading and hoops. It was one of the first woods utilized in making flat hoops in large numbers.

Elm staves are produced in a score of states, and the number in 1910 was 130,374,000. Red gum, pine, and beech were above it, and all other species were below. Michigan led all the other states in quantity, and was followed, in the order named, by Missouri, Indiana, Illinois, and Arkansas. The output is declining, and this is apparently due to lessening supply of elm timber near the centers of stave manufacture.

Elm not only leads all other woods in the production of hoops, but it exceeds twenty-fold all other woods combined. Elm, therefore, becomes practically the only hoop wood in the country. There is an apparent tendency to fall off in number, but the loss in elm is not made good by increase in the output of any other woods. The substitution of wire and other metal hoops accounts for the decline in wood. The elm hoops reported in 1910 numbered 283,029,000 and Ohio ranked first in production, followed in the order named by Michigan, Missouri and Indiana.

Though red gum is the leading stave wood for sugar barrels, white elm is important; and it is likewise important in the manufacture of apple barrels, butter tubs, candy pails, and buckets for tobacco. Pails and tubs are usually listed as woodenware, but they are none the less in the cooperage class. Many sizes of vessels are made other than those of regular barrel dimensions.

FURNITURE

Elm does not hold a place of first importance as a furniture wood, yet it is useful in the manufacture of a number of commodities. It was not much used for furniture making in early times, as it was seldom mentioned. Such was naturally the case, for better woods were plentiful in all regions where elm abounded, and it found place only after others that had been preferred be-



Photograph by J. R. Simmons.

THE CENTER OF MASSACHUSETTS

This elm, near Paxton, Worcester County, Mass., marks the exact center of the State. The circumference is 14 feet 8 inches and the spread before the removal of the largest branches was 85 feet. The tree, like many famous elms in New England is entering the last stages of old age and decay.

came scarce. The "orham wood" of which church pews were sometimes made in England is said to have been white elm from the eastern part of the United States.

In recent years elm has been successfully finished in a number of styles highly attractive. Some of the wood thus finished resembles the heartwood of sweet and yellow birch, other is of lighter tone and might pass for the sawwood of birch, or for maple, and by deepening the color the wood becomes an imitation of cherry. The resemblance to other woods is secured by giving elm colors similar to those of the woods imitated, and not by copying figure and grain. Few woods possess as little natural figure as elm, and stains and fillers do not impart much figure because the annual rings are not clear cut, large pores are not numerous, and medullary rays are small and inconspicuous.

Elm's place is in cheap furniture or in the interior parts of more expensive kinds. Reports by manufacturers indicate that the total demand for elm by furniture makers is above 20,000,000 feet a year. The Ohio Valley, with Michigan, Wisconsin and Missouri, use most of this wood that goes into furniture. A rather large quantity is employed in chair making, including chairs for children, invalids and for camps. The wood



THE STIRLING ELM

This is on the estate of Mr. Henry E. Pellew of Sharon, Litchfield County, Conn. At a point 4 feet above the ground it is 18 feet in circumference. Its greatest spread is about 90 feet. It was planted between 1750 and 1755.



HOOPS MADE FROM ELM

Elm is the principal wood used for hoops in the slack cooperage industry. In 1910, the last year that statistics of this kind were gathered, there was produced a total of 29,571,200 hoops. Of this quantity 28,302,900, or nearly 96 per cent, were of elm.

is employed in the manufacture of kitchen tables and other furniture, because of the ease with which it may be kept white by scrubbing. Its usual place in furniture making is as frames. It is listed as material for mission furniture, billiard table rims, bed slats, china closets, and benches and stools. Elm is well suited for bentwood work. It bends nearly as easily as hickory, but is not as strong and does not take as smooth polish. Splinters are more liable to rise from the surface than when hickory is the wood employed. In Michigan white elm is reported as church pew material.

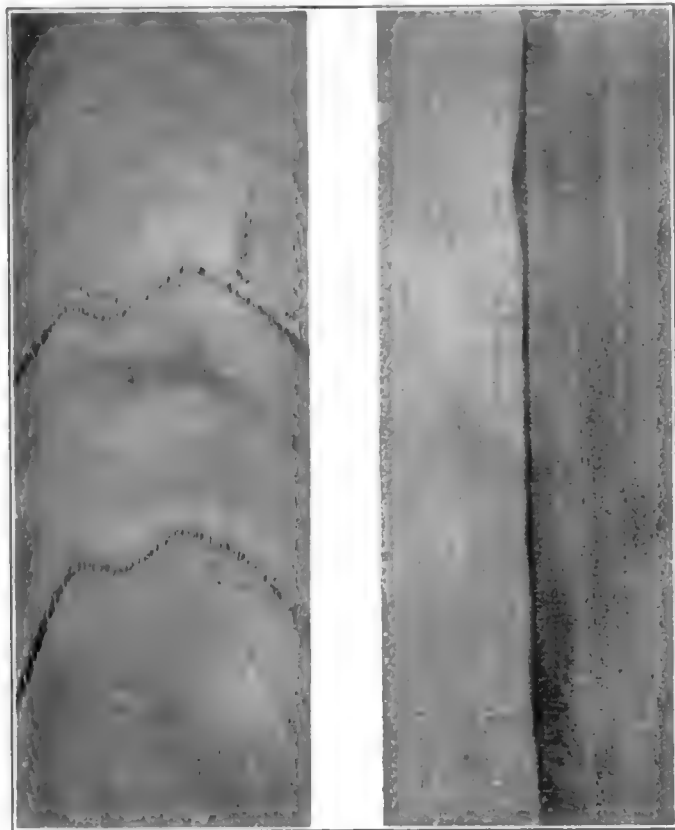
BOXES AND CRATES

The facility with which elm may be bent without steaming or otherwise heating it makes it excellent crate stuff, particularly where long pieces are wanted as when furniture and machinery are shipped. Thin elm boards, 10 feet or more in length, may be bent in the form of a circle without breaking. That quality is valuable for certain kinds of crating.

The annual demand for elm for boxes and crates ex-

ceeds 40,000,000 feet a year in the United States, or about 15 per cent of the total sawmill output of this wood.

Baskets when made of elm are classed as boxes, since they are generally of the kind used as shipping contain-



AMERICAN ELM

Tangential or bastard cut. The rows of pores which mark off the annual growth rings form wavy lines.

Radial or quarter sawed section. Rows of pores in a vertical line. Pith rays or "silver grain" in conspicuous.

ers. Frequently a part but not all of a basket is of elm. The hoop or band round the top of the vegetable or fruit shipping basket may be of this wood, while the veneer or thin splints composing the sides is of another, and the bottom may consist of a third.

Smaller boxes of finer finish are made of elm. The best example is the cigar box, which has a core of this wood with a veneer of Spanish cedar. The purpose of the cedar is to supply the odor which is usually insisted upon by the purchasers of cigar boxes. Recently, however, a finish for elm has been perfected which is acceptable in the box trade without any veneer. The odor is lacking or is artificially imparted, while the elm is bought and sold as "Michigan cedar."

Manufacturers of small boxes, such as are used for knives, forks, spoons and similar ware in dining rooms and kitchens, list white elm among the woods used. Some of these boxes are so nicely finished that they pass for cherry or birch.

VEHICLES

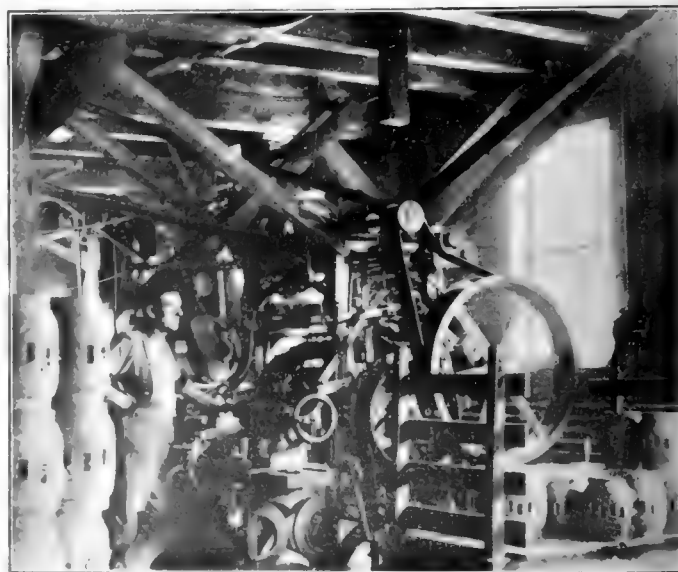
Elm wagon hubs have been in demand since the first wagons were made in this country. The wood is valuable chiefly because it is difficult to split, and hubs stand hard

usage. It is not quite as hard as oak and much softer than hickory, and large spokes of heavy wagons are liable to wear the hub mortises and work loose. Otherwise, this elm would be as good hub material as the forests produce. The latest demand for white elm by vehicle makers amounts to about 20,000,000 feet a year; but this goes into various kinds of wheeled vehicles, constitutes different parts, and is important in the manufacture of sleds and wheelbarrows, and also automobiles. In Missouri white elm is much employed for cart axles, in Michigan for auto bodies, in Kentucky as wagon tongues, while numerous patterns of sleds are made of it from the strong and clumsy steamboat to the hand sled which children use. It is likewise manufactured into accessories of vehicles, particularly singletrees, double-trees, eveners and neck yokes.

MISCELLANEOUS

White elm enters into a large number of miscellaneous articles. There are few industries which use wood that do not find place for more or less elm. It is said to have been split for rails on the western frontiers in early times, particularly in Iowa. But that use could not have been extensive because elm is difficult to split and no rail maker would tackle it unless nothing better was available. In the paragraphs which follow, mention is made of some of the uses which white elm has been reported.

It supplies timbers on which heavy cannons are mounted, either in place or on carriages; fixtures for banks, offices, stores and saloons; interior finish for



A FAVORITE FOR HUBS

In the vehicle industry elm is highly prized as raw material for hubs. It is especially important for use in the manufacture of wagon wheel hubs. The accompanying picture shows the interior of a hub factory with a number of finished elm hubs in the foreground.

houses. As fixtures and finish it generally occupies a place out of sight, and serve as frames, braces and stays. In some instances it is given artistic finish and there compares favorably with birch and cherry. A lower class of service is given when elm is employed as stall and



ELM USED FOR MUSICAL INSTRUMENTS

Elm stands sixth in point of quantity among the woods used in the manufacture of musical instruments, a total of over 15,500,000 board feet being required by this industry. It is required for various purposes and is particularly adaptable for being work. The accompanying photograph shows an elm log being cut up into bolts preparatory to its manufacture into banjo rims.

stable fittings, especially as floors, mangers and stanchions. It finds a place as henroosts in poultry yards, and when reduced to rods and dowels of small size it is utilized in making coops. It is likewise listed as material in the manufacture of brooders and incubators.

Makers of wooden pumps have places for elm. It is good for handles and sucker rods, and is placed as flooring over wells where pumps are employed. In kitchens and pantries it is regarded as very good wood for drain boards, because it is easily kept clean. Makers of ice boxes like it for its good, scrubbing qualities, and this consideration, as well as its wearing qualities in water, makes it popular material for parts of washing machines, washboards and wash benches.

In the manufacture of agricultural tools and implements it goes into cultivators, seed boxes, root cutters, potato diggers, sieve frames, bushel measures, riddle rims, and horse powers. Car builders make grain doors of it and it enters into different parts of freight cars.

Considerable quantities of elm are used by makers of trunks, chiefly as slats for the outside and three-ply veneer for the inside. Few woods are considered equal to elm for trunk veneer, woodenware makers draw supplies from this wood for ironing boards, sleeve boards, sign boards, and it is likewise worked into brush backs, game boards and apparatus of various kinds, stepladders, merry-go-rounds, music cabinets, picture molding, telephone accessories, parts of various musical instruments, including pianos, organs, and banjos, cant hook handles, pulpits, croquet sets, roll paper cutters, tanner's liquor logs, shoe heels, and printers' supplies. These indicate the wide range of elm's uses in the wood-consuming industries.

YALE SUMMER CAMP

THE Yale School of Forestry has announced that a summer camp for young men will be held at Milford, Pike County, Pa., for eight weeks beginning July 1, 1916. The course is designed to give a clear view

of forestry in a general way, its ideals, and the qualifications and requirements of a student in technical forestry. It has been particularly planned to meet the needs of young men who are looking toward forestry as a possible profession, but who are uncertain as to their fitness for the work and who are not prepared to begin the technical training necessary for professional standing. It is also designed for those who are not contemplating forestry as a profession but who are interested in woodcraft and wild life and who wish to learn something of the broader aspects of forestry. In addition to the regular course prominent lecturers on wild life and other subjects allied to forestry will address the students at the weekly camp fires.

FOREST FIGHTING EQUIPMENT

MOTOR cars equipped with fire extinguishers will be operated by the Boston & Maine Railroad on the Portland division this spring and summer to guard the forests along the lines from fires. Members of the fire patrol squad will be trained men, conversant with local conditions and the topography of the woodlands they are protecting. The motor cars will have in addition to patent fire extinguishers, pail, shovel, hoe, etc., for fighting grass as well as wood fires. The railroad officials believe they can save thousands of dollars in this way. In the past fires caused by locomotive sparks have burned into adjoining timberlands and caused serious loss before they were discovered and reported to the railroad men, while the railroad, of course, is responsible for the damage. The motor cars are built to travel over the rails as fast as an express train. If a patrol discovers a fire which he cannot extinguish unaided, he is expected to race to the nearest telegraph office to summon aid. The section gang of this division are also being organized as an adjunct of the fire patrol system.

MONUMENT TO A TREE

PERHAPS one of the most curious monuments in existence has recently been built in Ontario by Canadians, says the *Popular Science Monthly*. The farmers have just erected a marble pillar to mark the site on which grew a famous apple tree.

More than a century ago a settler in Canada named McIntosh, when clearing a space in which to make a home in the wilderness, discovered among a number of wild apple trees one which bore fruit so well that he cultivated it and named it McIntosh Red.

The apple became famous; seeds and cuttings were distributed to all parts of Canada, so that now the McIntosh Red flourishes wherever apples grow in the great Dominion. In 1896 the original tree from which this enormous family sprang was injured by fire, but it continued to bear fruit until five years ago. Then, after fifteen years, it died, and the grateful farmers have raised a marble pillar in honor of the tree which did so much for the fruit-growing industry of their land.

The story of this apple tree illustrates the African proverb that though you can count the apples on one tree, you can never count the trees in one apple.

金陵大學堂算學教習裴義理君創辦義農會專為中國貧民種植荒地自謀生計辦法甚善至公無私贊成諸君均願竭力襄助速觀厥成茲特書名於后

孫文 陸宗輿 張謇 陳貽範 黎元洪 袁世凱 蔡元培 吳景濂 劉冠雄 王寵惠 馮元鼎 唐元湛 柏文蔚 韓國鈞 應德潤 朱瑞 郁屏翰 景賢 吳介璋 徐佐楨 段祺瑞 施肇基 趙秉鈞 陳振先 宋教仁 熊希齡 伍廷芳 溫宗堯 程德全 唐紹儀

Lu Wei-hsiang, Sun Wen, Zhang Chien, Chen Yi-fan, Li Yuan-hong, Wang Ching-wei, Tsai Yuan-pei, Wu Ching-lien, Liu Kuan-hsiung, Wang Chong-hsiang, Feng Yuan-tung, Tang Yuan-tan, Po Wen-wei, Han Kuo-kun, Yin De-run, Zhu Rui, Yu Pin-han, Jing Hsien, Wu Chia-chang, Hsu Tzu-chen, Tuan Chi-jui, Shi Chia-chi, Chao Pao-chien, Chen Chen, Chen Hsun, Sung Chiao-jen, Hsiung Hsi-ling, Wu Ting-fang, Wen Tsung-yao, Cheng Te-chuan, Tang Shao-yi

The Purple Mountain Association was organized by Mr. Joseph Bailie, Professor of Mathematics in the University of Nanking, with a view to enable the students to earn their own living through cultivation of some lands. Being practical as well as amiable, the scheme has secured the hearty endorsement and promised support of the undersigned.

THE MAGNA CHARTA OF THE REFORESTATION MOVEMENT IN CHINA

This document was the means of permitting Professor Joseph Bailie of the University of Nanking, China, to start the work of reforesting Purple Mountain near Nanking, which is now the inspiration of a widespread movement in China to teach the Chinese the need of forestry. The main portion is composed of the signatures and seals of the noted men who signed the document. Below the signatures will be found their names as spelled in English.

Magna Charta of China's Forestry Work

DR. JOSEPH BAILIE
Instructor in Forestry, University of Nanking, China

THE November, 1915, number of AMERICAN FORESTRY contained an article by W. F. Sherfesee, Director of Forestry, Philippine Islands, entitled "The Reforestation Movement in China." In that article Mr. Sherfesee describes his visit to China to help us in opening our school of forestry in the University of Nanking and the survey he made of the southern part of the province of Antrim at the invitation of Governor Han. He also refers in rather flattering terms to the work already done by our university on the slopes of Purple Mountain, and draws conclusions from what he observed.

The object of this article is to add a few touches of human interest to what Mr. Sherfesee has written and to carry the history of the development of our College of Agriculture and Forestry up to date.

The illustration at the top of this page may seem to some a meaningless waste of printers' ink. To others it may seem a proof of the superannuation of "old Bailie." To the writer and those associated with us in the beginning of this work it is the Magna Charta of "The Reforestation Movement in China." It had its origin in the following way.

The fall and winter of 1911 found the writer engaged in giving relief work around the University of Nanking, China, and in the Mission compounds to 700 or more famine refugees. We made roads, filled ponds, drained unusable lands, and did other work. The object, however, behind the colonization movement was not to engage a

horde of laborers during famine times, on our own compound, letting all the advantage gained by the labor accrue to us in the form of rendering our residence less unsanitary, or to enable Americans to reach their own doors without having to wade knee deep through mud, however desirable all these results might be, but to use money contributed for the relief of the poor to produce results which would also be for the poor and not for their wealthy benefactors. It was only after the republic was set up in Nanking that we were able to inaugurate this movement, by the purchase of about one thousand English acres of the northwest slope of Purple Mountain.

Prior to this we had already organized the Colonization Association, which is composed of foreigners and Chinese, with Chang Chien as the national head. As one of the main functions of this Association is to hold lands in trust for the poor and as, according to present Treaty Rights, foreigners can not hold land in China, our board of trustees had to be all Chinese. So the land on Purple Mountain, though paid for out of money contributed both by Chinese and foreigners, was held in the names of five Chinese, though the documents were left in my possession as manager, pro tem.

On acquiring the Purple Mountain estate we were enabled to carry out the idea of accumulating for the good of the poor the results of their own industry, and to raise the number of those employed. We dug canals, grubbed stones out of the land, made roads and drives with these stones, levelled uneven places and made an

orchard and plantation of mulberries on the place, up to that time inhabited only by the ghosts of the departed. It was not until after consultation with some wide-awake Chinese friends that I dared to remove the graves scattered over about 100 acres and form a neat little cemetery, thus leaving the rest for the use of the living. This happened close on the heels of the establishment of the republic.

Though the parties really interested in these graves were perfectly satisfied, others, no doubt, from a sense of mistaken public duty, organized a campaign to stop us in our work. Hearing of this and knowing that any day a proclamation might be forced from the Tutuh¹ of Nanking stopping the whole work, I went to Shanghai to ask advice of Chinese friends. One of these, Mr. Huang, then Chinese secretary of the Famine Relief Committee, told me that I could never succeed as I was doing. I asked him what he thought I should do. He put his hand in the drawer, pulled out a sheet of paper and wrote the Chinese characters which form the solid block of

Chinese on the photo at the top of this article and when he had finished handed it to me and said "Go and get somebody to sign that." I was nonplussed, didn't know where to begin, and with heavy heart, took the document to Nanking. Something had to be done because the forces against us were coming to a head. Dr. Macklin, as soon as I showed him the document, rubbed his hands with glee and said, "We'll send it in to Sun (the provisional president of the new republic) before he leaves for Peking." We did so and he wrote the first two characters, Sun Wen (the official title of Sun Yat Sen) and stamped it with the seal of the republic. Not only so, but Tang Shao I, who had been sent down as representative of the northern forces to induce the Nanking government to go to Peking, also signed it, but as he hadn't his seal with him, no seal mark is attached to his name. Next day we sent the document to Huang Hsing, who was then the generalissimo of all the southern forces, and he signed and sealed it. Now we were ready for eventualities. Two days after Huang Hsing's signature the con-



THE NANKING BRANCH OF THE COLONIZATION ASSOCIATION

This picture was taken on the occasion of the visit of His Excellency Chang Chien, then Minister of Agriculture and Commerce, when he, with Consul Williams, representing the American Minister, Dr. Reinsch, arrived to plant trees commemorating the opening of the School of Forestry in the University of Nanking, March 14, 1915.

His Excellency is the central figure in the front row.

Front row—left to right; (1) Dr. Williams, Vice-President of the University of Nanking; (2) Dr. Macklin, who the Chinese say prevented the burning of the city of Nanking; (3) Wu Chi-chang, Magistrate or Mayor of Nanking; (4) Wang She-tong, the Taoyin or official in charge of the one-third of the province of Kiangsu, of which Nanking is the capital; (5) His Excellency Chang Chien, Minister of Agriculture and Commerce and as a private individual the greatest developer of industry in China and National head of the Colonization Association; (6) Yu Chi-chi, representing the Civil Governor who was absent on a tour of inspection of the province; (7) Ma Ting-shu, representing the General; (8) Wang Kwei-ling, Chief of Police, Nanking; (9) Tang Tan-yai, Manager of the Nanking Branch of Kiangsu Bank.

Second row: (1) Pu Chi, Secretary to Civil Governor; (2) Lu Tien-hu, Commissioner of Education for the Province of Kiangsu; (3) Chan Hsish-ren; (4) Wu Tsing; (5) Chen Sien-chah; (6) Li Mun-tsing; (7) Nagan Han, graduate in forestry, Ann Arbor, Michigan, and Secretary in Bureau of Forestry in Ministry of Agriculture, Peking; (8) Chang Tsen-pi, Chief Auditor for office of Road-builder and Secretary for Colonization Association; (9) Kang Hung.

Third row: (1) Shen Tung-fang; (2) Ping-sun; (3) Su Si-tai, President of Nanking Chamber of Commerce; (4) Tsui Kuei-sung; (5) Su Chang-sih; (6) Joseph Bailie; (7) Tao Pao-tsing, formerly representative to National Assembly; (8) Yeh Hsi-chi; (9) Chu Shou-ren; (10) Yang Hsi-chang.

Back row: (1) Wu Chiu-hsiu, President of Nitrate Mines; (2) Ku Chi, Investigator at Civil Governor's; (3) Li Si-yuen; (4) Huang Kuci, Director of Agricultural Station of Colonization Association on Purple Mountain; (5) Chiu Tsai; (6) Chiu Fu-ching, President of Law School of Kiangsu; (7) Chiu Lai-chih, formerly Vice-President of Kiangsu Provincial Assembly, head of the gentry of Nanking, and President of the Nanking Branch of the Colonization Association; (8) W. R. Stewart, Y. M. C. A. Secretary for Nanking.

¹The Tutuh was an official position created under the New Republic exercising the power of Governor and General combined.

servative forces at work in Nanking had succeeded in having the Tutuh issue a proclamation prohibiting my going on with the work on Purple Mountain until the matters brought against me by these societies had been discussed and disproved. This I knew meant a full stop to the work as I would not attempt to disprove facts. However, I reasoned thus. Here is the proclamation of a Tutuh. But prior to the Tutuh's issuing this procla-

to do with his dismissal, though as far as I knew it had nothing to do with it.

As soon as we heard that Cheng Leh Chuan was to be appointed new Tutuh, Dr. Macklin and myself jumped on the train and went down to Soochow and presented the document to him for signature. "Of course, I shall sign it, for this is just the sort of work that is going to save China," was the prompt reply of the good man. As soon as he came to Nanking we were safe from any further direct attacks. We were allowed to go on and gain by active philanthropy those who opposed us with their theories.

This opposition was not fully overcome till after the second revolution. At that time, the city of Nanking was taken and sacked by the barbarous soldiers of Chang Hsun. Had it not been for Dr. Macklin, for whom the old general held a high regard on account of having saved the lives of some of his generals, the city would have been burned. As it was all the gentry that could get away fled to Shanghai, where they were safe in the foreign settlement, leaving their wives and children in the university and mission compounds, and leaving us to look after them as best we could.

To alleviate the suffering from cold and hunger that

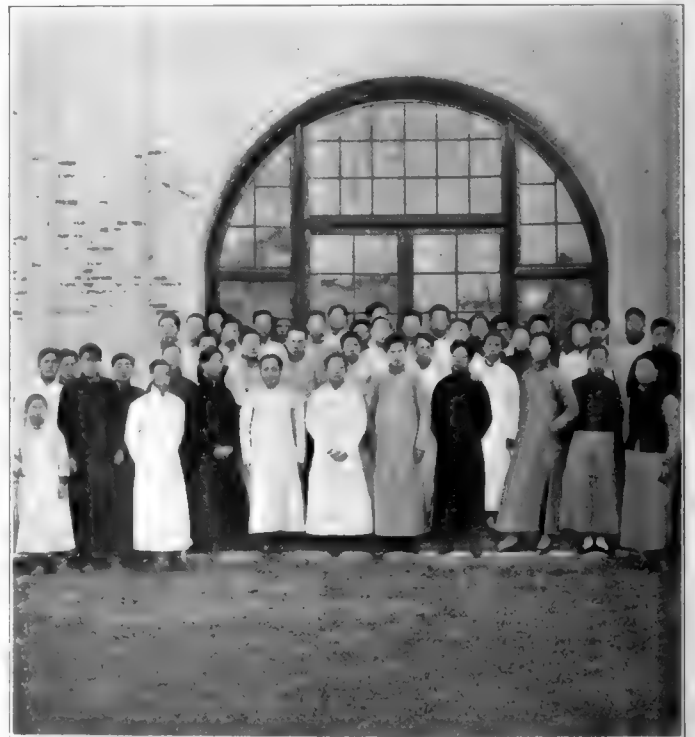


SCIENCE HALL, UNIVERSITY OF NANKING

This substantial building, thoroughly modern in every respect, is an indication of the up-to-date methods of education at this university.

mation, the generalissimo had endorsed our work. He cannot use soldiers without the permission of his superior. His superior will not stultify himself by sending soldiers to stop what he has signed to support. Here I am with about a thousand able-bodied men with picks, shovels and spades, and no paper emanating from any source but that of brute compulsion is going to drive us off this mountain, seeing we are fighting literally for the right of the poor to work to keep life in.

The morning following the posting of the proclamation in the tea house at the foot of the mountain, I was detained in the city seeing after other matters, and it was nearly 9 o'clock when I reached the place of roll call. When I reached the place, all the squads of workmen were standing ready for work, but the foreman and students in charge did not dare to order the men to turn a sod in face of the proclamation. Pretending to be incensed at the remissness of all and pretending also to be ignorant of the proclamation (of course nobody was deceived), I asked each squad leader what he had been doing yesterday and ordered him to take his men and go on with the work. They all went quietly and as if in dread of some evil. But 12 o'clock came and no squad of soldiers appeared to stop us. Night came and we were still in possession. The next day everyone expected something dreadful. But nothing came and by night they had all settled down to the belief that they must have behind them good, if not better, backing, than the Tutuh. The political game threw the Tutuh out of office three days after the issue of this proclamation, and it would be hard to make these one thousand workmen believe that his issuing of this proclamation had nothing



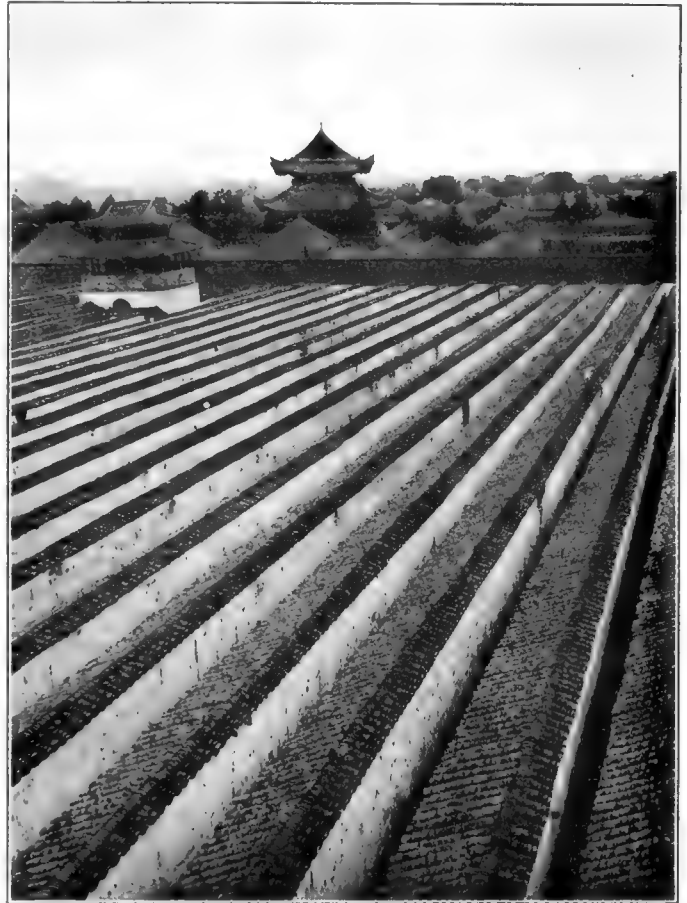
HIGH SCHOOL LITERARY STUDENTS

From this class of bright, capable young men is recruited the students who take the course of instruction at the University of Nanking. The future of China depends largely upon such of her young men as these.

came in the wake of the looting of the city, money and rice began to be sent. But how were they to be brought to Nanking, seeing that Chang Hsun had threatened to commandeer all the Red Cross supplies and use them for his soldiers. At this point the foreigners in charge of this work in Nanking sent the writer to Shanghai to bring up relief in the shape of money and help in any way

possible. On the day of my leaving Shanghai to bring money, rice and clothes to the sufferers in Nanking, there awaited on me at the Shanghai station of the "Shanghai-Nanking Railway" not a delegation of the gentry of Nanking, but practically the whole of the Nanking gentry, thanking me personally for what I was doing and especially Dr. Macklin for having saved the city, and all the missionaries for having remained and saving the people, when they themselves, who ought to risk their lives as "fathers and mothers of the people," had deserted their post. They expressed regret for having opposed us in the work of the Colonization Association and said they were now shamed into cooperating in what they now knew was an unselfish enterprise.

As soon as order was established and the city of Nanking had paid an indemnity of 800,000 taels the gentry were allowed to slip back into Nanking. No sooner than it was safe to organize a meeting they met with us and established the Nanking Branch of the Colonization Association, appointing three of their members as trustees. At the next meeting I handed over all the documents of Purple Mountain to the president of the Nanking branch, Mr. Chin Chiheng, the head of the Nanking gentry and a Hanlin. Never have I seen more astonished faces than on that day when the deeds of the land over which there had been so much fighting and on which close on to thirty thousand dollars had been spent in developing, were handed to the legal owners. The association had been formed and the burden of



EXAMINATION CELLS AT NANKING

In these cells the Chinese students took their examinations while keen-eyed observers in the towers placed at intervals watched to see that the work was done fairly.



EXAMINATION TOWER

A close view of one of the towers at the examination halls at Nanking, China.

holding these deeds was taken off my shoulders. Since then any doubt that existed that what we were doing has anything of selfish motives in it was entirely removed. They look upon us Americans as their friends.

The American government's foregoing its legal right to take from the Chinese government the Boxer indemnity; the turning of this indemnity money into a fund to found the Tsing Hua College at Peking to prepare students to come to the United States for a university training and then after being prepared to come here, to pay their expenses while here; this generosity of the American government has made America beloved by that very class that is to rule China in the near future. But we need also the personal element to cement that friendship of the two nations and this we believe is found in such institutions as our College of Agriculture and Forestry of the University of Nanking.

The Chinese nation is unconquerable. It swallows up its conquerors. The Manchus came and subdued the nation, but where are the Manchus now? They are lost and are absorbed by the great Chinese people. Nor are the Manchus the only conquerors that have been absorbed. Let others that think of the partition or subjugation in part or in whole of the Chinese nation keep these facts in mind. America has the confidence of every Chinese of intelligence both in the United States and in China. Any approaches now made to help the nation to develop

its national resources and then alleviate the condition of the worthy poor will be appreciated and backed by cooperation from the Chinese. As an instance of the readiness of the Chinese to benefit by any help we can afford, the minister of agriculture and commerce has shut the Government School of Forestry in Peking and sent twenty-four of the best students to our school, thus making ours the national school of forestry. Not only so, but on my departure from China for the United States he gave me a letter of commendation in which he stated that if we can establish certain institutions in connection with our school, the university, he will cooperate with us. Not only have I his letter commending this work to the American public, but Dr. Reinsch, the American minister in Peking, has given his letter recommending the work to his government and the American people.

In response to this, Secretary of Agriculture Houston has offered to grant leave of absence to those in the government employ who can be spared and may desire to spend one, two or more years helping us to develop the work around Nanking. Mr. Graves in the Forest Service has done likewise. But these officials cannot provide payment for such men without an act of Congress.

Were I in position to do so I should urge the granting of the money by act of Congress or the using of some part of the indemnity money for this work, and my reason is as follows: First, we can help a great nation in need. Second, we can help a great nation that will appreciate the help. Then comes the selfish reason. China is to be the greatest nation on earth when she is developed. Are we to fight her or are we to have her as a close friend? The opportunity is now given to the United States to save China from her enemies and to seal her as an eternal ally. No one who knows the Chinese character as those of us who have spent over a quarter of a century among them, can doubt of the undying friendship that the Chinese have for those whom they trust. I can reckon among my very staunchest friends the very men that fought me from a mistaken fear that I was going to "do" them. They had good reason to fear me and I don't blame them. Foreigners have come and have done things in the name of helping China that make us all hang our heads. But once the Chinese trust you, there's no such a thing as trusting half way. You're a bosom friend. America as a nation is on the straight road to become that bosom friend of China, and a grant now in response to the appeal of the minister



DR. JOSEPH BAILIE

Of the University of Nanking, China, who is now in the United States endeavoring to arouse interest in China's forestry problems and secure assistance in reforestation work.

of agriculture would do a great deal to seal that friendship.

But as I cannot hope for this government grant I appeal to the patriotism of our countrymen to assist in one of the greatest schemes now before the human race, the afforestation of China. We have arrangements made for the carrying out of plans in connection with our university. The government of China has given us as first installment of lands a grant of ten square miles. The minister has asked us to show the Chinese nation, on this and other tracts that will be donated when this is planted in trees, how to go about the forestation of the country.

The American government is willing to aid in lending men who know how; who will help out in giving the salaries of these men?

My trip from California to the East was made possible by Major Ahern's kindly enlisting the financial help of Charles Lathrop Pack, of Lakewood, N. J., the president of the American Forestry Association; Dr. Henry Sturgis Drinker, former president of the American Forestry Association, and Capt. J. B. White, Kansas City, Missouri, a director of the same association.

Anyone desiring to help this work kindly address Dr. Robert E. Speer, president of the board of trustees of the University of Nanking, 156 Fifth Avenue, New York City, or President A. J. Bowen, University of Nanking, Nanking, China.

FERTILIZER FROM WOOD ASHES.

THE present isolation of the large potash beds at Stassfurt, and the consequent rise in the price of this important fertilizing ingredient, have led the Department of Forest Utilization of the New York State College of Forestry to make some few tentative studies into the commercial production of potassium oxide from hardwood ashes by burning and leaching. The Department is tempted to state that there is a good market for the soluble salts that can be thus obtained, in view of the fact that such salts are at present bringing from ten to twelve cents per pound, with a very good prospect of their going much higher in the near future.

POTASH IN WOOD ASHES

THE increase in the demand for potash has resulted in a number of inquiries of Government officials concerning the amount of this chemical contained in wood ashes which may be available at sawmills operating on the National Forests.

The Bird Department

By A. A. ALLEN, PH.D.

Assistant Professor of Ornithology, Cornell University

THE RETURN OF THE BIRDS

IT is now nearly three months since the first horned larks started northward over snow-covered fields. Already they have their young on the wing and are ready to start another brood; yet there are many birds that still have hundreds, even thousands of miles to travel before they will reach their nesting grounds. The March robin brought forth its crowd of admirers, the call of

lark, and mourning dove, which come during March, are much less regular because of the idiosyncrasies of the weather. If there were no such thing as weather and if food were always equally abundant; if it were one great level plain from the Amazon to the Great Slave Lake, the birds would swing back and forth as regularly as a pendulum and cross a given point at exactly the same time every year. For this migrating instinct is closely associated with the enlargement and reduction of the reproductive organs, a physiological cycle which, under normal conditions, is just as regular as the pulsing of the heart and records time as accurately as a clock. With most species the organs of mature birds begin to enlarge before those of birds hatched the preceding year, and those of the males before those of the females. Because of this, the male birds arrive first and are followed by the females and later by the immature. With some species like the robin, bluebird and phoebe, there is very little difference in the time of arrival, but in the case



FOUR HUNGRY BABES

A Louisiana water thrush feeding its young. This bird winters from Mexico to Colombia and arrives in the northern United States during the first of April.

the bluebird drew a response from others, but now when every hedge-row and thicket resounds with musical voices and even the trees of the city streets flash with brilliant warblers, everyone likes to stop and listen and notice the unusual number of birds. And we cannot help wondering whence have come these little wanderers, where they are going, and what is the meaning of their journeys. In great waves they come from the South, flood us with beauty and song for a few days, and then pass on. Wave after wave passes over us during the course of the month until June arrives, when the last immature birds hasten on to their nesting ground and leave us with only our summer birds until the fall migration shall bring them back once more.

A little observation from year to year shows us that these May birds are extremely regular in their appearance and disappearance. One can soon learn just when to expect each species, and if the weather is normal, it will arrive on the day set. The earlier birds such as the robin, bluebird, blackbirds, Canada goose, meadow-



A BANK SWALLOW

Hovering over its burrow, these birds winter in northern South America and arrive in northern United States during the last of April.

of the red-winged blackbird, often a period of two weeks or even a month intervenes. This may be a wise provision of nature to insure the selection of a nesting area that will not be overcrowded for once the male has established himself, and it is often at the same spot year after year, he drives away all other males from the vicinity, awaiting the arrival of the females and particularly his mate of the previous year.

But with the later migrants, such as the shorebirds, that have a long way to go, the females usually arrive with the males, and with some species, courting takes place en route and they arrive at the breeding ground fully mated and ready to nest.

In the October number of *AMERICAN FORESTRY*, in considering the departure of the birds, mention was made of the distance traveled by different birds in their migrations and here again it is interesting to note where birds have wintered as explanatory of the time of their arrivals in the spring. The early migrants are those that have spent the winter entirely within the United States. This is true of all the March birds in the northern states but during the last of the month, the first birds from the West Indies and Mexico begin to arrive in the southern states. About the middle of the month many of the birds that have wintered still further south begin to ar-



A BUSY WORKER

This red-eyed vireo is busy repairing its nest. The bird winters in northern South America and arrives in the northern States during the first part of May.

rive, including the swallows, the spotted sandpiper, the black and white warbler and the water-thrush. The last of April and first of May brings even to the northern states the initial wave of birds from Central America and perhaps even northern South America and about the middle of this month, when occurs the height of the migration thousands of tiny warblers, vireos and fly-catchers that have been wintering on the slopes of the Andes or the pampas of Brazil, are winging their ways overhead to Labrador, Hudson Bay and Alaska. The shortest route which one of the very last to arrive, the blackpoll warbler, may traverse, is 3,500 miles, while those which nest in Alaska must travel over 5,000. Some of the shorebirds which bring up the close of the migration in late May or early June have undoubtedly come from Chile and even Patagonia and still have several thousand yet to go so that before they reach their nesting grounds again, they will have traveled 16,000 miles since leaving in the fall.

This constrains us to wonder how these tiny wayfarers are able to traverse such tremendous distances and still

return so accurately to their homes. That they do so is certain, for many birds have been marked so that we know that the same bird often comes back to the same place year after year and builds a nest close to the one of the previous year.

At one time it was thought that they had well-marked



A RING NECKED PLOVER

This bird winters as far South as Patagonia and does not reach the northern States until the last of May or the first of June.

highways in the mountains, rivers and coast lines, surveyed, as it were, by their ancestors and unfailingly followed by all descendants. But now it is believed that these highways are followed only so far as they afford abundant food and when the food supply lies in some other direction, they are regardlessly abandoned. What is it then that guides them mile after mile in their flights, flights made mostly under cover of darkness and often at altitudes varying from 2,000 to 5,000 feet above the earth? A sense of direction, it is now called, an instinct for recording directions as accurately as a compass which we, having only so crudely developed in ourselves, are at a loss to understand; an instinct which permits birds to travel north, south, east or west and not lose their bearings. For the migration route of most birds is not directly north and south, and many preface their southerly journeys by long flights directly east or west. The bobolinks and vireos of the northwestern states, for example, leave the country by way of Florida or the Gulf coast and first fly directly east to the Mississippi Valley to join the others before starting southeasterly. The white-winged scoters which nest about the lakes of central Canada, upon the completion of their nesting duties, fly directly east and west to the Atlantic and Pacific where they winter. Some herons preface their migrations by long flights, even to the north, so that occasionally little blue herons and egrets are found in the northern states during August and September.

With birds that travel such enormous distances, it is interesting to note their rate of advance. While it is possible for birds to travel great distances without rest, as witnessed by the fall flights of the turnstone from Alaska to Hawaii or of the golden plover from Labrador to northern South America, distances of over 2,000 miles across the open sea, they do not ordinarily progress far in single flights. The spring advance of the robin, for example, averages only 13 miles a day from Louisiana to southern Minnesota. The rate increases gradually to 31 miles a day in southern Canada, 52 miles per day by the time it reaches central Canada and a maximum of 70 miles per day by the time it reaches Alaska. It should not be inferred from this that each robin does not ever migrate less than 13 or more than 70 miles in a single day. Probably they often fly more than a hundred or two hundred miles in a single flight, as do, undoubtedly, many of the smaller birds, but after each flight they dally about

day. The latter are, for the most part, birds that find their food in the open and can feed as they travel. Such are the robin, the kingbird and the swallows. Other birds, like the sparrow, vireos, warblers and march birds, that find their food in the seclusion of trees of dense vegetation, migrate entirely by night. The necessity for this is shown when they arrive at the Gulf of Mexico or other



A PIED BILLED GREBE

The mother bird and two youngsters out for a swim. This bird spends its winters from the southern States southward and arrives in the northern States during the last days of March.

their resting place for several days before starting on again, and this brings down the general rate of advance.

The rate of speed at which birds travel is rather difficult to estimate except for the homing pigeons which can be timed from one place to another or the ducks and geese whose conspicuous flocks traveling high over cities and towns can easily be followed. The championship speed for homing pigeons has been recorded as 55 miles per hour for a period of four hours. A great blue heron has been timed by a motorcyclist keeping directly below it and found to be 35 miles per hour. A flock of migrating geese has been found to be traveling at a speed of 44.3 miles per hour and a flock of ducks at 47.8 miles. The speed of flight of smaller birds is usually less although when they mount high in the air and start on their migratory flight, they doubtless travel faster than the birds one so often passes flying parallel to a passenger train or suburban car.

The vast majority of birds migrate during the night; some migrate both by day and night, and others only by



REDWINGED BLACKBIRDS

These birds spend their winter in southern United States and arrive in the northern States during the last of February or the first part of April. The males often arrive two weeks to a month in advance of the females.

large bodies of water where it is impossible to get food of any kind. If they started early in the morning so as to be across by night, they would not be able to secure much food before starting, and by the time they reached the Mexican side, it would be dark and again impossible to feed. Thus an interval of thirty-six hours would elapse without food, a period that might result disastrously for many birds because of their high rate of metabolism. If, however, they spend the day feeding and migrate by night, their crops are full and when they arrive at the other side of the Gulf, it is daylight and they can begin again to glean their living.

During these night migrations birds are attracted by any bright steady light, and every year hundreds and thousands dash themselves to death against light houses, high monuments and buildings. While the torch in the Bartholdi Statue of Liberty was kept lighted, as many as 700 birds in a month were picked up at its base. On some of the English lighthouses where bird destruction was formerly enormous, "bird ladders" have been constructed forming a sort of lattice below the light where the birds can rest instead of fluttering out their lives against the glass. Again in crossing large bodies of water, they are often overtaken by storms and as their plumage becomes water-soaked, they are beaten down to the waves and drowned. Sometimes thousands of birds are killed by a single storm. But of course the vast majority sweep on and arrive at their destinations in safety.

And so if we step out on a cloudy night this month, when the birds are migrating low to escape flying through the mist-laden clouds, and hear their strange calls only faintly resembling their familiar daytime notes, we can picture to ourselves, the thousands of winged travelers returning from a sojourn in the tropics and pushing on through the black night, guided, by an innate sense of direction, pursuing their course straight to their old homes. We can think over the past ages through which this migrating habit has evolved to the days when all North America basked in a tropical sun and birds darted among the palms and tree ferns without ever a thought of leaving the land of their forefathers. Then we can picture to ourselves the coming of the ice age and the destruction of all the life that could not adapt itself to the changed conditions or flee before it. We see the birds gradually pushed to the southward, encroaching upon those already there. We understand the crowding that ensued and how these birds spread northward again as the glaciers receded, only to be forced back once more with the coming of winter. Then, with the withdrawal of the ice and the evolution of the seasons, these migrations, by repetition through the ages, became permanent habits or instincts; and with the ensuing modifications in the contour of the continent, and the changes in the location of the food supply, many variations developed in the migration route of each species which seem inexplicable today.

We picture these things to ourselves; we understand a little better the great mystery of the bird's life, and perhaps we can appreciate somewhat more fully the presence in our thickets and gardens of these songsters, whose lives are ever one series of hardships and dangers, and yet which, withal, are so expressive of the happiness and joy to be derived from nature.

BLASTING AND TREE PLANTING

BY F. W. WILSON

RECENTLY, nurserymen who make a specialty of shade and ornamental trees have been making experiments and a special study of transplanting large trees and they have been successful beyond anything that was ever dreamed of ten years ago. Nowadays a man can buy a suburban or a country property and have old shade on it within a few months after building his home.

Park Commissioners throughout the country have been especially interested in these experiments with the transplanting of old shade trees. It has been a serious matter until recently to have a beautiful old tree in one of the city parks die. It was regarded almost a national calamity when the old elms in Harvard yard at Cambridge, Mass., became diseased and died. A wealthy Harvard Alumnus has recently agreed to provide the money to replace these old elms.

The planting of a large old shade tree is not the simple matter, however, that is the planting of a young year or two old seedling direct from the nursery. It is con-

sidered an art to be able to transplant one of these large old trees and have it grow and thrive.

G. W. Sherman, a Park Commissioner of Breckenridge, Mo., has been carrying on some interesting experiments in transplanting of old shade trees in the Breckenridge Park. The accompanying pictures were taken by him. One shows an old dead tree being blasted out with



THE OLD TREE AND THE NEW

After the old dead tree had been easily removed by dynamite the tree seen on the right was planted, the hole being large enough to accommodate its extensive root area.

dynamite. A number of these trees ranging in size from 12 to 18 inches in diameter were disposed of in this way. The other picture shows a tree about 24 feet high that was planted in the same hole out of which the old dead tree was lifted.

Mr. Sherman is very enthusiastic over this method of planting. The hole made by the explosion is large enough to accommodate the new tree and gives the latter an exceptional chance to grow rapidly and thrive well because the blasting breaks up and pulverizes the soil within a radius of several feet, making it easy for the newly transplanted tree to throw out its new rootlets and feeders and making available plenty of moisture and plant food to give the new tree a good start and ample sustenance to insure its steady growth.

Tree Bark as Human Food

BY HU MAXWELL.

WHEN the many kinds and great numbers of trees constituting the American forests are considered, it is remarkable that the bark of so few of them is of value as human food. Many an excellent woodsman has starved to death in the forest because he could not find in the bark of trees the means of sustaining life. Nuts and other fruits in season supply food; and many herbs possess edible roots which Indians and frontiersmen of early days knew how to prepare and use as food; but the bark of trees was usually of no avail as a means of preserving human life in time of famine.

Such a thing may be possible, but it is barely probable and then only under favorable circumstances. In summer when fruit is ripe and the weather is warm it is more nearly possible than in winter or when conditions are not the best. At any rate, the bark of trees could be depended upon to a very limited extent only to supply food.

No fact of forest history is better known than that the Indians often died of hunger in the primeval wilderness. They knew the trees well and were acquainted with the food value of all the nuts, buds, roots, and bark that existed in the regions over which they ranged, and yet large numbers sometimes perished of sheer hunger. It is true that life was often prolonged or saved by a bark diet, but evidently it was not always possible to do so. Much depended upon the region, the season of the year, and the kind of trees within reach.

Much light is thrown on this matter in a series of books known as the "Jesuit Relations," consisting of some



WESTERN YELLOW PINE BARK AS FOOD

These trees are in the State of Washington. It was in this region in 1805 that Lewis and Clark first recorded the fact that Indians used this tree's bark for food. The bark has been so used, in a small way, over an area of nearly a million square miles.

That, however, has not been the popular belief. It is quite commonly supposed that in the days of the pioneers when forests were everywhere, that the hunter or traveler who knew the woods was able to peel a tree trunk, skin out the soft inner bark and make a tolerable meal of it and thus appease hunger and sustain life in times of adversity. That did sometimes happen under certain conditions; but it was unusual. Some theorists who know very little of woodcraft and of the real resources of the primeval forests, have lately amused the public by writing articles pretending to point out how a man can go into the forest and without clothes, food or shelter, remain indefinitely without assistance other than that found naturally in the forest.



INDIANS ATE WESTERN RED CEDAR

Formerly Indians of the Northwestern Pacific Coast made much use of the soft inner bark of this cedar as an absorbent of fish oil and bear fat, and ate the mixture, which they said was palatable. The custom, however, no longer exists.

eighty volumes, made up chiefly of letters and reports by French missionaries among the Indians of Canada, the Great Lakes region, and the upper Mississippi valley. The period embraced about 150 years, dating from 1630. Starvation was one of the common matters discussed by those missionaries who lived with the Indians and shared their sufferings; yet hardly ever was bark referred to as an article of diet, though the famine might be appalling, and though almost every possible food resource was tried by the starving people in seasons of sore distress.

One of the few allusions to bark eating in all the voluminous correspondence of the Jesuits in America is here quoted, in translation from the French. It occurs in a letter written by Louys Andre in 1670, from the vicinity of Lake Nipissing, Ontario. In volume 55, page 135, he writes:

"All of these poor people have for some time been suffering from a famine, and I found them reduced to a fir tree diet. I never would have believed that the inner bark of that tree could serve as food, but the savages told me that they liked it. I know not whether it would always be so, but I do know very well that, when hunger forced me to seek some sort of food to keep me from dying, I could not swallow fir bark. I did, indeed, eat some bark of another tree, and hunger made me find therein the taste of bread and the substantial quality of fish."

The precise tree species here spoken of is not certain, the French word "sapin" has been translated "fir tree." It was probably the balsam fir (*Abies balsamea*), but possibly the hemlock (*Tsuga canadensis*) was meant.

The soft inner bark and the adjacent layer of jelly-like new wood of many trees are not offensive to the taste and possess some food value, but this material is procurable only in late spring and early summer, for it is at that season that active growth is taking place. Later in the season this new material hardens into wood and is then difficult to chew and is apt to be offensive to the taste. At the time of year when this growing inner bark is at its best, there are other foods in the forest, and hunger can be appeased by them. If this growing layer of wood and bark were available in winter, when nearly all other eatable things are lacking, it would no doubt

have been eaten much oftener by the Indians and other hunters. It is often eaten at the present time, not from necessity but from choice. That is true particularly of the bark of the sweet birch in eastern forests and of the yellow pine in the forests of the western country.

The writer of this once happened upon a camp of Mono Indians on the headwaters of Finegold River among the

Sierra Nevadas, and found them feasting in great hilarity upon the inner bark of the western yellow pine (*Pinus ponderosa*) which they had peeled from the trunks of the neighboring trees. That was in the spring when the young bark was forming. I sampled the uncooked bark and the taste was not bad; but no trial was made of the boiled product, because the culinary practice of the Indians was not appetizing. Those people were not driven to bark-eating by famine, but were doing it because they liked the taste. A deer they had killed that morning was hanging unskinned on the limb of a tree in camp. It may be mentioned incidentally that one of the Indians who seemed to find special pleasure in the pine bark soup took pains to tell me that he could "sing" in Latin, and to prove it he recited an extract from Virgil's Aeneid in the original tongue. He said he could "sing the whole business." Possibly he might have done so, for he seemed to get along nicely with the dozen or so lines, which he chanted for the edification of the visitor. I was told that he had been educated for a Catholic priest, but he had failed to make good, chiefly because of an appetite



SLIPPERY ELM IS WELL LIKED

The thick, soft inner bark will allay hunger, but it is believed to have very low food value for human beings, though the lives of horses may be sustained by it. Children chew the bark for the same reason that induces them to chew gum.

for liquids stronger than pine bark soup.

The use of yellow pine bark by Indians seems to have been of long standing, and was not and is not confined to any locality or region. The habit has had a wide geographical range. It was mentioned in the journals of Lewis and Clark during their expedition across the continent in 1804-1806. In speaking of a locality near the head of the Missouri River in what is now western Montana the journals say:

"We saw where the natives had peeled the bark of the pine trees about the same season (spring). This the Indian woman with us informed us that they do to obtain the sap and the soft part of the wood and bark for food."

The custom of eating this pine's bark was referred to

later in the journals of the expedition. The region was the western part of the present State of Washington.

Government agents nearly a hundred years later reported that the bark-eating Indians in the State of Oregon were injuring the pine forests. The report was by John B. Liebig and may be found in the United States Geological Survey's twenty-first annual report, part V, page 290, as follows:

"The custom of the Indians of peeling the yellow pine at certain seasons of the year to obtain the cambium layer which they use for food, is in some localities a fruitful contributory cause toward the destruction of the yellow pine by fire. They do not carry the peeling process far enough to girdle the trees, but they remove a large enough piece of bark to make a gaping wound which never heals over and which furnishes an excellent entrance to fire. Throughout the forests on the Klamath Reservation trees barked in that manner are very common. Along the eastern region of Klamath marsh they are found by the thousand."

The bark of another far western tree has long served the Indians as food, but it does not appear that white men have ever been forced to use that resource to preserve life. It is the gigantic western cedar (*Thuja plicata*), often known as the shingle cedar, because most of the shingles used in the United States and Canada are made of this wood. Indians inhabiting this tree's range, from Oregon to Alaska, make use of the wood and bark for various purposes. Most of the huge totem poles which stand like sentinels at the doors of wigwams, or on hills overlooking villages, are carved from the trunk of this tree. The largest canoes in the world have been hewed from the enormous boles of this cedar; and the Indians' dishes, platters, troughs, and their grinning clawed, and fanged graven images of idolatry are carved from the soft wood of this gigantic coniferous tree. The bark is as useful as the wood. Its long, tough fibers are spun into threads and woven into mats for beds, blankets, and portieres for wigwam doors; ropes for manufacturing dog-harness, and lines with which to haul canoes up rapids of rivers on the native's long journeys. But the uses of the bark does not stop there. It is pounded in wooden mortars until reduced to pulp, is then mixed with as much whale oil, fish oil, or bear grease as it will absorb, and is then kneaded into loaves, cakes, and cookies, which are baked

in ashes of the camp fire and become bread. It is said to be palatable and nourishing, but it is probable that the nourishing property is due more to the grease and oil, than to the bark. At any rate, the Indians of Vancouver, Queen Charlotte, and other islands, and on the mainland of British Columbia, like it and seem to flourish on the diet. In color the cedar bark bread resembles a chocolate cake; but it is tough and it requires the strong jaws of an Indian to negotiate it, and it may be supposed that as a regular diet it would not suit the stomach of a dyspeptic person.



SWEET BIRCH IS TASTY

The inner bark or cambium layer of this birch is pleasant to the taste in early summer, and peeled trees in many parts of the range of the tree betray the extent of its use as food. Children are the greatest eaters. The tender bark of twigs is also gnawed and eaten.

The slippery elm tree (*Ulmus pubescens*) grows throughout the eastern half of the United States. Its inner bark consists of a thick, soft, brittle mucilaginous layer. It is quite distinct from the cambium layer, which is the spring growth of new wood and bark. In that respect it differs from most of the other barks used for human food. The elm's edible bark may be taken off either winter or summer. Its character is little influenced by the season of the year. Physicians have always used it for medicine and poultices. And old-time medical book declared that elm bark was worth its weight in gold, because it is a life saver when employed as medicine. It may not be esteemed as highly now as formerly, yet all drug stores keep it for sale. Perhaps more slippery elm bark is sold for medicinal purposes than any other bark native to the United States; certainly more of it is eaten than of any other.

It does not rate high as a food. In fact, analysis shows that the bark contains very little that can be classed as human food. Records of lives saved from starvation by elm bark are few and doubtful. Yet it is habitually eaten in all regions where it grows. It is difficult to find slippery elm trees in the vicinity of towns, for the reason that children single them out and peel them of their bark which they chew for the same reason that they chew gum—not for food but as a habit. It has no more taste than remains with gum after the flavoring has disappeared; yet it satisfies the desire of the jaws to be chewing something. The bark is usually swallowed, and seemingly it does little good or harm, although it is indigestible.

Horses may be kept alive and in fairly fit condition on an elm bark ration, as was demonstrated in the war of 1812 during the Lake Erie campaign; but when men try

to live on it they rapidly lose strength. It appeases hunger but does not repair the waste of the body.

The native tree bark most pleasing to the taste is that of sweet birch (*Betula lenta*), which is one of the birches whose woods contribute lumber for doors, furniture, and interior house finish. The tree ranges from Newfoundland to Minnesota, and southward along the Appalachian Mountains to Georgia and westward to Illinois and central Tennessee. This is the birch from which the "oil of wintergreen" is usually made by the distillation of the wood and bark of small trees.

Early in summer the new growth beneath the bark is of considerable thickness and is rich and starchy, with a pleasant taste. Trunks may then be peeled and the edible portion may be scraped from the underside of the bark. It needs no cooking or other preparation but is eaten raw, and hunger is satisfied. It is at its best only during a few weeks in early summer. After that, the edible portion becomes woody.

The food value of birch bark seems to be well established, but it is not known how long it is capable of sustaining human life in the absence of all other food. During the Civil War it was, on one occasion, put to a severe test. It was during the campaign in what is now West Virginia by Gen. McClellan in 1861. At the battle of Carracks' ford, where the town of Parsons now stands, several companies of Confederate troops from Georgia were cut off from the rear of Gen. Garnett's retreating army, and fled into uninhabited mountains. Several hundred of these soldiers, who were already in a famishing condition, escaped through a pathless wilderness, across Tucker, Randolph, Pendleton, and Highland Counties, with practically nothing to eat except birch bark. It was in early summer. Not a man starved to death during the long retreat through the forest. Many years afterwards the writer of this was able to follow the route of the retreat by noting the peeled trunks of birch trees from which the soldiers had secured the bark for food.

CORRESPONDENCE COURSE IN LUMBERING

THE correspondence course in lumbering which is being offered by the State College of Forestry at Syracuse through its forest extension service is attracting wide attention in New York State. Already a number of men have enrolled, and it is believed that this taking of instruction out into the State to those who are handling or using lumber and other products of the forest will mean much in developing more extensive utilization of forest products now wasted. The course is open to any man or woman in the State, and one may enroll at any time.

GEORGE WASHINGTON PROFILE.

THE Natural Bridge of Virginia was one of the earliest discovered natural curiosities of America, but it was only a few years ago that in the aperture beneath the bridge there was seen to be a huge, distinct profile, assuredly the head of George Washing-

ton. At least the profile is that of a man and moreover it is that of a patrician with a prominent, slightly aquiline nose and good forehead. It will be seen by examination of the photograph that the nose and mouth are formed by the projection of small bushes from the side of the bridge and it may be considered quite probable that prior



Photograph by Dr. Charles D. Walcott.

PROFILE OF GEORGE WASHINGTON

Natural rock heads and faces are not uncommon, but a profile due to the absence of rocks is unusual. This is looking through the gorge of the Natural Bridge of Virginia, and the profile is that of George Washington. The nose and mouth are outlined by the bushes.

to the signing of the Declaration of Independence the verdure of this side of the gorge grew in such a manner as to cause the face to have no resemblance whatever to the Father of his Country. But few people know of this profile today, and of those who do, some have tried in vain to get into proper position to show it up for photographing. The present photograph was taken by Dr. Charles D. Walcott, when Director of the United States Geological Survey.

A Private Forestry Undertaking

BY A. F. HAWES, *State Forester of Vermont*

IN the summer of 1909 the newly created Vermont Forestry Department made a working plan of a tract belonging to Dr. Wm. Stanford Stevens in Enosburg, Vermont. Since that time the owner of this nine hundred acre tract has consistently followed out the recommen-



NATURAL MAPLE REPRODUCTION

A sugar orchard from which the poorer trees have been cut in order to permit natural maple reproduction.

dations of this plan. As Dr. Stevens lives on the place only a portion of the year he was unable to give it the attention necessary to make it successful as a dairy proposition. The plan, therefore, contemplated the discontinuance of active farming by the owner. He has continued to sell his hay from the mowings, and by the application of commercial fertilizers has aimed to keep up their fertility. The pastures were all in bad condition owing to the fact that fully half their area was taken up with ferns, which could not be eradicated without the expenditure of considerable money.

The chief expense called for in the working plan was for the reforestation of these run-out pastures. About one-third of the area was typical northern hardwood forest, and part of it had been used as a sugar orchard as a large part of the trees were maple. These were badly infested with the borer. There were also a great many dead and down trees, and a good many large mature hemlock, that were ready to cut. The plan outlined systematic reproduction cutting throughout the wooded portions, with a view towards securing natural reproduction of sugar maple, white ash, basswood and yellow birch.

During the six seasons which have followed the making of this plan, Dr. Stevens has planted 262,000 trees, including 25,000 used for filling in vacant places, covering about two hundred acres. There still remain 144 acres of pasture to plant, and this will be completed at the rate of 50,000 trees a year. The total cost of the planting thus far completed is \$2,282.42, or an average of \$9.22 per thousand for those now living. Practically all of these trees have been purchased from the State Nursery.

The species used are: White pine, 237,000; Norway pine, 12,000; Norway spruce, 13,000; making a total of 262,000 trees.

With the exception of the trees planted in 1911, a very dry season, most of them have lived and are now making a rapid growth. In fact the planting is such a



SCOTCH PINE PLANTATION

Four years ago Scotch pine seedlings were planted here and the vigorous growth they have attained is evident.

success that the owner is now contemplating the reforestation of the poorer meadows.

The material removed in the reproduction cuttings has sold for more than enough to cover the cost of cutting. The total sales of wood and lumber have amounted to \$3,239.54, while the cost of getting out this material was \$1,357.75, leaving a profit on the operation of \$1,881.79. The appearance of the woods has been much improved thereby and reproduction, especially of maple, has followed in a very satisfactory degree.



COWS PREVENT MAPLE REPRODUCTION

The effect of permitting cows to graze on this character of land is evident. Maple reproduction has been prevented.

To summarize the results of the six years' work it may be said that about three-quarters of the woodland has been improved and 200 acres of nearly worthless land have been reforested, and thereby made productive. When the provisions of the present working plan are completed, a revised plan will be made for another ten-year period. The financial summary for the first six years is as follows:

Cost of cutting	\$1,357.75
Cost of planting	2,282.42
Expert assistance	103.76
<hr/>	
Total cost of operations	\$3,743.93
Total receipts	3,239.54
<hr/>	
Net cost of all improvements	\$504.39



NO COWS ALLOWED HERE

this orchard the cows have been excluded and as a result there is a vigorous reproduction of maple.

Yield tables are not available to estimate the future value of the hardwood forest, but it is safe to estimate that it will be worth considerably more in twenty years than it would have been, had it been left to itself, and the revenue has been used to reduce the carrying charges on the plantations.

It is safe to estimate that the plantations when forty years old will be worth \$250 an acre. Considerably higher prices have been paid for pine plantations of this age. Two hundred acres at this price will be worth \$50,000. An investment of \$504 for forty years at 5 per cent amounts to \$3,548. Leaving taxes out of consideration, therefore, the profit on the operations thus far undertaken should be about \$46,000, over and above 5 per cent compound interest on the investment.

FIRE WARDEN'S MEETING

THE Fire Wardens of Monroe County, Pa., held their third annual meeting at Pocono Manor recently on invitation of Edwin A. Hoopes, president of the Pocono Protective Fire Association. The State Department of Forestry was represented by Chief Forest Fire Warden George H. Wirt and District Forester John L. Strobeck. These annual meetings are regarded by the Department of Forestry as very important aids to an effective fire service. They bring the men together in a social way that develops comradeship, and, besides, they furnish opportunity for instruction in the duties of fire wardens. The idea of an annual meeting and dinner originated with the Pocono Protective Fire Association. Its results have been found to be so satisfactory that wardens' annual meetings are now required by the department in each Pennsylvania county where forest fire service under the new law has been organized.

WHAT SAWMILLS WASTE

THE waste product of sawmills in the United States including that fed to the furnaces as fuel is estimated to be 36,000,000 cords per year, and the equivalent of 2,880,000,000 cubic feet of solid wood substance. About half of it has no use whatever, but is usually burned to get rid of it.

DRYING LONG-LEAF PINE

IMPORTANT laboratory experiments at the Federal Forest Products Laboratory at Madison, Wis., are being followed by practical commercial experimenting in the Louisiana field, by members of the federal staff, on the saving of time in drying long-leaf pine. No report can be made on these experiments as yet, but it is understood that the experimenters demonstrated a commercial saving of about 20 per cent in the new method of drying the southern pine. As successful in the laboratory, the time of drying is cut from forty-eight hours, the old time, to thirty-nine hours, about 20 per cent, meaning that much saving in the operation of the kilns. Following the laboratory experiments, the experimenters are now trying out the new method commercially for the Tremont Lumber Company, at Winfield, Louisiana.

The Conifers Curse

By R. E. TAFT.

ONE pleasant day in June, a matter of twenty years ago, a party of sightseers were strolling through a dense forest of spruce and pine in the Rocky Mountains. A young man suddenly stopped, set his foot on a decaying log and delivered a few ill-chosen and evidently hasty remarks.

A "splinter" had penetrated the toe of his shoe and caused some inconvenience to one of his pedal extremities incased therein.

The writer, with an accumulated mountaineering experience of fifteen years, was prepared for such emergencies, and with a small pair of steel pincers soon removed the "splinter," which proved to be a porcupine's quill.

While this "surgical operation" was in progress a little girl, with curiosity and sympathy equally divided, came rushing down the mountainside. An unnoticed bush caught her feet and sent her headlong upon the ground. Scream upon scream of agony rent the atmosphere and the writer's pincers were again called into action to extract two porcupine quills from the palm of one hand and a dozen more from her body and clothing.

Five years previous to this time a hunter had emptied both barrels of a shotgun into a belated porcupine.

As time passed, his adamant and seemingly imperishable barbs had become scattered over about ten square rods of ground, to the inconveniences and results aforesaid.

A few minutes later the party came upon a huge spruce tree with a large section of the trunk near the ground showing clear and white in the rays of sunlight that shot through an open space in the forest.

The porcupine that had chosen the inner bark of the tree for his midday lunch stopped his work to gaze with apparent wonder at the intrusion upon his domain.

A well-directed pistol shot put an end to his depredations.

The death-dealt tree was one of hundreds noted in the course of the day that brought from one of the company the query of, "What is a porcupine good for?" In the good old orthodox days the inquiry would have been dismissed with the simple statement that all things were created for a beneficent purpose; that the purpose became apparent upon close investigation. The close investi-

gations of those days brought the conclusions that the fly was a scavenger that preyed upon and destroyed disease-breeding filth—that the mosquito removed bodily impurities that lodged near the human epidermis.

The science of the day has upset and revised those old theories and a war of extermination is now being waged upon those pests.

An acquaintance with and study of the habits of the porcupine, extending over a generation of time, has convinced the writer that this rodent has not one redeeming trait, nor can a good reason be given why he should be permitted to exist. Like his brethren, the gopher, the rat and the mouse, he should be billed for extermination.

In furtherance of this belief I began a warfare upon the species with gun, pistol and trap and found at the

end of a dozen years that no inroads had been made upon the number in my vicinity.

Every day or two I would find a tree girdled near the ground or denuded of bark to the top. In one instance I measured off a block of ground 50 by 100 feet and found forty-two out of fifty-seven trees therein destroyed by porcupines. Their nocturnal habits made it out of the question to rid a neighborhood of them by shooting, while traps can only be used at the entrance of their dens. There are but two months in the year (May and June) that they are found at large in daylight, and dens are used only while breeding or during cold weather. In summer their nights are spent in foraging and with the approach of daylight they take refuge under a log, rock, clump



HOW PORCUPINES KILL TREES

They eat the bark, girdling the tree near the ground, or climbing the tree and stripping the more tender bark from the top. In one tract the author found forty-two out of fifty-seven trees destroyed by porcupines.

of sage brush or grass for the day. In the latter retreat they are a constant menace to stock.

A frequent sight in our mountain grazing areas is a cow or steer with nose fairly bristling with quills, due to the animal having suddenly thrown its head down into



POISON BOARDS FOR PORCUPINES

Porcupines love salty things and finding something saline in a newly painted board chewed the board. This gave the author an idea and soaking boards in brine he sprinkled them with strychnine, placed them in the forest and killed many porcupines.

a clump of grass or bushes only to land upon the barked back of a slumbering porcupine.

Nor is this all—the animal is extravagantly fond of salt. Anything containing the slightest taint of salinity is food for his teeth. A prospector's tool handles, ropes, ore buckets, etc., are speedily gnawed to pieces, while the homes of all mountain residents are rarely free from their nightly maraudings from spring till fall. For years the writer obtained some relief from their depredations by the use of a shot gun or six-shooter at all times of night, but the annoying destruction to buggies, sleighs, boxes, barrels, etc., went on, and the work of burning their bodies and clearing the premises of quills was still more exasperating—for when a porcupine is shot or struck with a missile or club the quills fly in all directions—a fact that probably gave rise to the story of our grandfathers that a porcupine possessed the power to throw his quills at an approaching enemy.

Five years ago the writer moved into a newly completed house, but the quiet of night was soon disturbed by the grind and rasp of a porcupine's teeth. I found that one of them had discovered something saline in the paint on a veranda railing. This gave me an idea and I carried it out in the way shown in the photograph. A quart bottle was filled with strong brine and a set of boards was thoroughly soaked with it. While still damp, strychnine was liberally sprinkled over them. (The photo shows the boards, brine and one ounce of strychnine bottles, also a small tree girdled and killed by porcupines.) These

boards were distributed in two square miles of forest area and had the effect of completely ridding a half township of the pests.

Some of these poisoned boards were placed in their winter dens; others were nailed to trees above the reach of horses or cattle or under trees whose low lying limbs prevented stock from getting to them, while others were fenced in. The poisoned faces of those used in small tree areas were protected from rains and wet snow by boards nailed across the tops.

The dead porcupine at the foot of the large tree was the third destroyed during May, 1910, at an expense of about one inch eaten from the side of the board. The tree was debarked by the rodents three years previously. It was the only instance where one of them was found near the boards.

Porcupines are very tenacious of life, but it can be taken as a certainty that when their teeth marks are found on the boards a dead pest will be found in the vicinity.

Complaints of the destructive work of these animals are heard from all sections of our country where conifers grow. I have read of instances where tree owners were paying \$1.00 for each porcupine killed on their grounds.

The method I have used will quickly and cheaply put an end to their work, and I would not have given it to the public had I not reached the belief that this most repulsive



THE PORCUPINE

One of the many which the author killed by poisoning, strychnine being placed upon the board nailed to the tree. Note how the bark has been stripped from the tree by the animals.

of all animals should be condemned as a nuisance and its ravages minimized, if he is not entirely exterminated. This can be done by concerted action on the part of private owners, the special agents and forestry officials in charge of the public domain.

NATIONAL FORESTS' TIMBER

OF the 688,922,000 board feet of timber cut on the National Forests during the fiscal year ended June 30, 1915, according to statistics just compiled by the United States Forest Service, 123,168,000 feet was taken under free-use permits given to settlers and others living in or near National Forests. There were 40,000 free-use permits, and the value of the timber they cut was \$206,464.13.

The remainder, or 565,745,000 board feet, was cut under sales contracts, for the most part with lumber operators, but including 19,246,000 feet sold at cost to farmers and settlers, as required by a special provision of the law. The prices received for all sold timber varied from 50 cents to \$5 per thousand feet, and the total value was \$1,179,448.39.

EXPERIMENTAL NUT ORCHARD

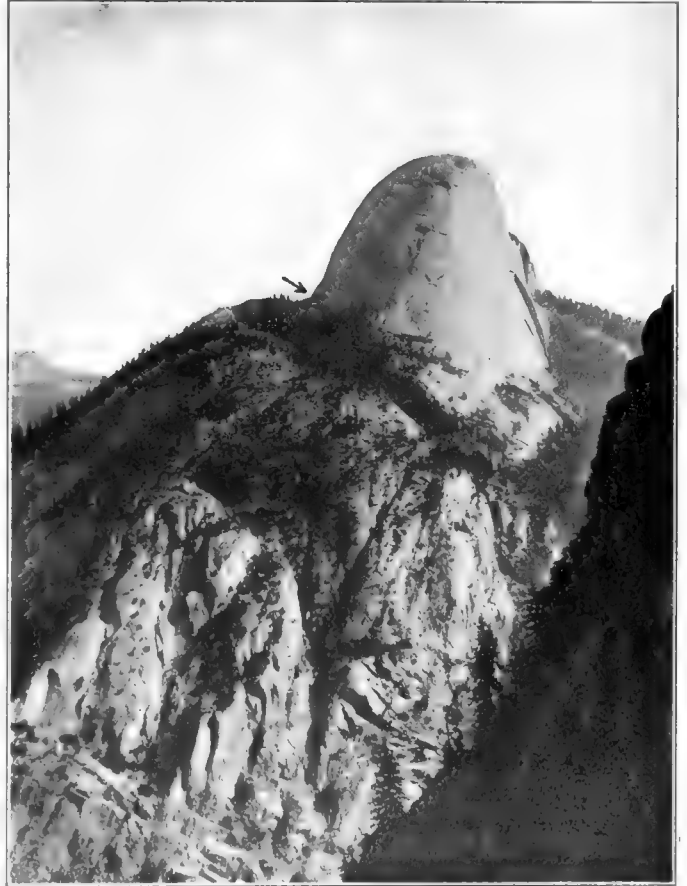
THE New York State College of Forestry is planting an experimental and demonstration nut orchard on its Chittenango Forest Experimental Station. English walnuts, Paragon chestnuts, pecans and Hardy almonds in different varieties, also hazelnuts and filberts, will be tested for hardiness, growth and adaptability to New York conditions and bearing proclivities. The English walnuts secured from the Jones Nurseries at Lancaster, Pa., and planted last season, have grown vigorously, the seedlings having attained a height of 27 inches. The fact that these seedlings have come through the winter in perfect condition is very gratifying and shows the possibilities of nut culture throughout this region.

HUGE DOME OF GRANITE

BY GUY E. MITCHELL.

ONE of the most remarkable masses of solid granite in the world is the huge bare dome surmounting a high mountain of the same imperishable rock. The mountain itself rises very steeply from the almost flat floor of the Yosemite Valley and the view shown in the photograph is an unusual one of the rear of "Half Dome" taken from the crest of the beautiful Nevada Falls. The hugeness of this dome may be better appreciated when you know that the tiny looking trees at its base near the arrow, are big pines over 100 feet high. Straight up from the arrow to the top of the dome the distance is 1,400 feet. The other side of the granite dome is a sheer perpendicular face of 2,000 feet. Incredible as it appears, it is possible for a good mountain climber to scale this dome and crawling to the edge to look over and even drop a stone straight down over a third of a mile before it will strike. The remaining 2,500 feet to the bottom of the valley is only a little less sheer, and

objects in the valley 4,500 feet below, such as horses and people, appear smaller than ants. Only those with well seasoned nerves dare approach the edge of this half dome without being fast tied with ropes. The great rock is of course immovable, but with most people there is a vivid impression that it is falling, and a strong tendency to become panic stricken and pitch over the edge to ter-



HALF DOME, YOSEMITE VALLEY

Rear view of Half Dome, Yosemite Valley, Cal. A great granite mass which overlooks the Valley from an altitude of 4,756 feet above its floor.

rible destruction. The great granite sentinel must have been shorn apart by some mighty cataclysm in past ages.

Half Dome is the commanding feature of the upper end of the Yosemite Valley with Tenaya Creek passing by one side of it and the Merced River on the other, uniting in the main Yosemite Valley.

DAMAGE BY WILD ANIMALS

THE annual losses of live stock on the National Forest ranges of the West due to predatory animals are over \$500,000. An organized campaign is now going on to exterminate these animals. Wolves are responsible for about 70 per cent of the cattle losses, while bears cause most of the remainder. Approximately 75 per cent of the sheep losses are due to coyotes, 20 per cent to bears, and 5 per cent to lynxes and wild cats. Mountain lions are charged with killing only a few head of cattle and sheep.



Photograph by R. S. Maddox.

FEARFUL WASTE FROM EROSION

Showing how millions of cubic yards of rich agricultural soil have been washed away by erosion and have become a menace to bottomland fields, streams and the Mississippi River. The planting of trees and grasses has proven a very practical and effective means of stopping gullies. All of these thrive when planted on "made land" if they get the proper protection.

Fighting Gully Erosion

BY W. R. MATTOON, *State Forest Examiner*

DURING the last few years both public and private interests have become very active in efforts to check extensive soil erosion in western Tennessee. The State Government, the industrial departments of at least two large railroads, many private owners, and the U. S. Department of Agriculture, through the County Agents connected with the States Relations Service, are all engaged in this work. The situation has been brought to the serious attention of the public by the widespread depreciation in value of farm lands amounting in the aggregate to many millions of dollars.

The very deep, mellow, siliceous loam of the Lafayette, or "orange sand," formation which spreads widely over west Tennessee is easily workable and for the same causes very susceptible to erosion and transportation by water. In good agricultural practice, constant care is required on slopes to plow, cultivate, and sometimes terrace parallel with the contour lines in order to stop incipient gullies that may start. The general surface of the region is gently undulating, rising gradually eastward in a plateau slope to the ridge near the Tennessee River where it becomes broken. The region includes most of the State west of the Tennessee River, an area about 60 miles in width by 100 miles in length extending in a north and south line across the State.

In about eight counties, nearly every farm contains portions of land lying waste because of gullies, and there are many large tracts each covering several hundred acres in area that have been abandoned for the same cause. The character of these is shown in the accompanying illustrations. The result is a sparse population of an unprogressive class and a general depreciation in all property values in a region where the soil is capable of being maintained in a highly productive state. Mr. R. S. Maddox, Forester, State Geological Survey, Nashville, who has devoted most of his time during the past two years to gully reclamation work, estimates the area of land thus affected at not less than 230,00 acres.¹ Gullies usually are from 15 to 25 feet deep. At La Grange, Fayette County, gullies of immense size, 70 to 100 feet in depth, have encroached to the very edge of the town center, and the main highway leading south is retained only at high expense of grading, filling and concrete work.

The pernicious, long-standing habit of "clearing up," "working out," and "turning out," or abandoning, pieces of land as soon as they lose their natural fertility is unquestionably the underlying direct cause for the present situation. The birth of gullies usually takes place in cultivated fields where they might have been easily put out of the way by a little timely attention. They increase

¹The Resources of Tennessee," January, 1915, p. 13.

with astonishing rapidity, and soon outgrow the fields where they started, invading adjacent territory. An accompanying photograph shows a main public road retreating before the advance of a large gully. Many of the present larger gullies no doubt started during the "trouble in the sixties," continuing afterward when there was neither money nor labor for improvement. Prior to that time for about ten years under the leadership of several public spirited Tennesseans, the people began to study out and apply the best methods of "preventing their lands from running away."

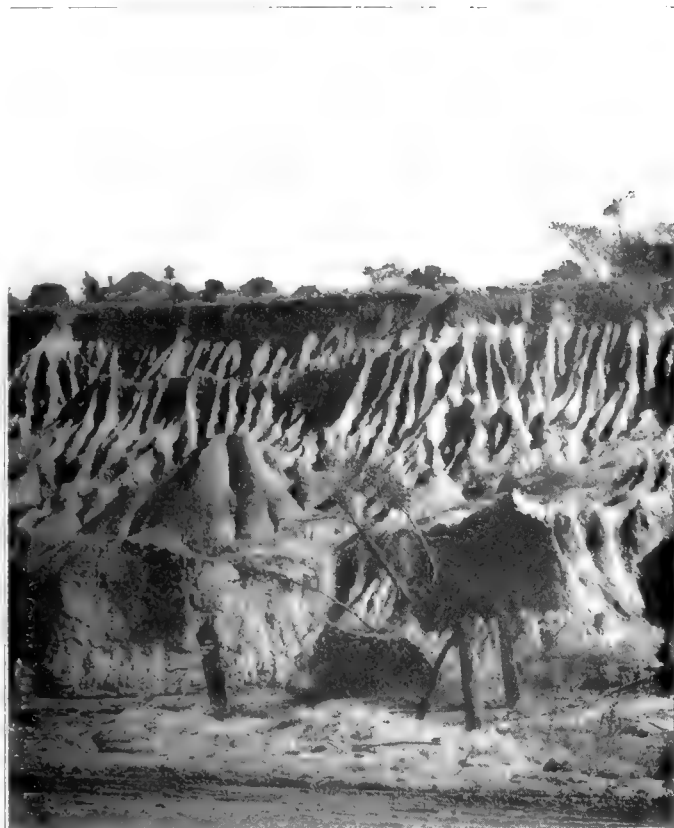
The planting of trees and grasses has proven a very practical and effective means of stopping gullies. Black locust, yellow poplar, ash, red oak, black walnut, catalpa, cottonwood, and other trees, also bermuda grass, when started on "made land" in gullies, all thrive under the



PLANTING NECESSARY HERE

This farm gully was planted with 12-inch black locust seedlings at the rate of about 1,200 per acre, and within a year they had grown to a height of 4 feet. In seven years the gully slope was completely reclaimed by the black locust trees.

protection afforded. Preparatory steps to planting consist of constructing compact brush dams across narrow places in the gully, thus securing "made land," and in grading down by hand or team sufficient loose soil to enable the young sapling to secure a foothold. Many of the woodlots in the region have been reduced to cull trees only, and since they exist on good agricultural land are more than likely to be cleared. The best policy for the future would be to convert the larger gullies into farm woodlots by the methods suggested, serving the double purpose of checking further destruction of land and growing a supply of farm timber on the least valuable part of the farm.



APPROACHING THE HOME

At the present rate of progress made by this gully, the home buildings of the owner of the farm will be engulfed within a few years.



ENGULFING A COUNTRY ROAD

An expensive gully which year by year approached a country road which has several times had to retreat before it and now runs in almost a half-circle around it.

²Bulletin, University of Tennessee Agricultural Experiment Station, vol. 8, No. 3, page 107.

The Greenheart of Commerce

By C. D. MELL

THE wood known to the trade as greenheart or bibiru is produced by a massive tree growing in the Suianas and in parts of Venezuela in South America. It is called greenheart because the heartwood of this tree is yellowish-green. It is highly esteemed for its usefulness in marine construction and other work requiring a strong and durable wood.



LEAF AND FRUIT OF THE GREENHEART TREE

The leaves remotely resemble the tupelo, but are larger, being from 6 to 8 inches long and 2 to 3 inches wide. The fruit, like a large walnut, when ripe falls to the ground, soon germinates and sends down a stout tap root. The young tree grows rapidly at first.

The greenheart tree is easily recognized in the forest by its long, clean and cylindrical bole and its light gray, thin, flaky bark, which contrasts very strongly with that of its associates. It ranges from 60 to 120 feet in height, and from 2 to 4 feet in diameter. Chief among the trees which in height and circumference vie with greenheart are the mora and the West Indian locust. Mora is a tree which grows to an enormous size, frequently attaining a height of 100 to 150 feet—sometimes it reaches a height of nearly 200 feet, but when it is as large as

this the tree generally has a hollow trunk at the base. The West Indian locust usually grows very tall and produces a trunk that is without branches for more than 80 feet.

The stems of greenheart are often without branches for more than three-fourths of their total height, and are usually cylindrical to the first branches for 50 to 90 feet, and logs from 12 to 24 inches square can be obtained. A number of logs 70 feet long and 14 inches square are shipped to the English markets. Logs 85 feet long, 14 inches square and perfectly straight, are occasionally met with. The crowns in old, mature trees are usually open, round and small, as compared with those of large trees of other species in the tropical forests. It has a few large branches at the base of the crown, which extend at right angles to the main axis; the upper branches are more ascending and are rather twisted and knotty.

The small branches are more erect and bear the leaves which are comparatively large and elongated, remotely resembling those of our tupelo, only they are larger, measuring from 6 to 8 inches in length and from 2 to 3 inches in width. They taper to an acute point at both ends, have a smooth glossy surface, a leathery appearance, especially when old, and are arranged alternately on the twig. The flowers are more or less inconspicuous in comparison with a good many other large tropical trees; they are at first greenish but later turn whitish or pinkish in hue. The fruit of greenheart is large, and in general outline favors a large walnut. Its thin pericarp is light brown in color, almost smooth, and encloses a single large seed.

When the fruit is ripe it falls to the ground and soon germinates, sending a stout taproot down through the leaf mold into the sandy or gravelly clay soil beneath; at the same time it develops a stem with large leaves which secure part of their nourishment from the large cotyledons in the seed during the first six or eight weeks of the life of the young plant. It makes a rapid growth at first, while the stored-up food in the seed lasts, but its struggle for existence becomes keen when this source of nourishment is exhausted.

The first year the seedling attains the height of about 12 inches and develops from 2 to 4 large leaves; the second year it shoots up to the height of 2 or 3 feet, after which it goes on increasing until it attains the height of about 20 feet, when its rate of growth in height and diameter decreases. It is during the first four or six years when the young greenheart trees are liable to suffocation from other more vigorous trees and shrubs. Only one out of hundreds of greenheart seedlings may grow up to become a tree. The old trees produce seeds every year, and practically all of them germi-

nate, but one rarely sees greenheart saplings from 2 to 4 inches in diameter in the virgin forest.

Those who have lived among greenheart trees all their lives, and who have watched them grow from year to year have observed that the rate of growth of trees over 4 to 6 inches in diameter is exceedingly slow, and that it varies according to the locality and soil. It grows fastest in forests of deep, alluvial soil. Here the roots can spread far and find more nourishment than in the sandy clay region on the uplands. The rate of growth is so slow that the annual rings on a transverse section of a greenheart stem are not visible with a hand lens magnifying from 4 to 6 diameters, but from general observations it is known that even young trees on the hills and drier slopes with soil or with rock near the surface, grow very slowly. It is considered that at least 100 years are required for a greenheart tree to acquire a merchantable size, and a good many of the large trees that yield logs 24 inches square are doubtless over 300 years old. The period varies much, however, in different regions of its range of growth and also upon immediate environment of the individual trees.

Greenheart is known to occur in British, Dutch and French Guianas and in parts of eastern Venezuela. The reports that this tree is found in Brazil and in Colombia have not yet been authenticated, but it is quite likely that it grows in Brazilian Guianas near the mouth of the Amazon. It grows chiefly on the moist slopes and ridges where the tops are exposed to the rays of the sun. On the dry, exposed ridges as well as in the wet soil along the rivers, it becomes scarce or disappears altogether. In the regions where it occurs most abundantly, the soil is a sandy clay, or, in some localities, almost pure sand and gravel. A stiff clay soil with a sufficient amount of sand to render it loose is favorable to its complete development. In the lowlands where the soil consists of sand and loam, greenheart occurs less abundantly.

In its habits greenheart may be considered to be partly gregarious, for although it always grows more or less intermixed with other trees, it is generally confined to certain areas of rather limited extent. It may constitute the prevailing tree for a few hundred yards, but seldom

for a mile continuously. Such localities are the moist slopes that receive the moisture-laden air from the ocean, and it is here where it attains its best development from a commercial point of view. It is obvious that a tree depending on so many local peculiarities cannot occur continuously to any great extent. The Colonial Forest Office of British Guiana determined by actual count that on a sample area which contains greenheart in merchantable quantities, there were on an average about 150 timber trees to the acre, 32 of which were greenheart. About 73 per cent of the greenheart trees were found to range in circumference from 48 to 180 inches. Trees which will not square 10 inches are not permitted under the Crown Lands Regulations to be cut.

The quantity of greenheart in British Guiana has been, and still is, very great, although the lower forests have been heavily worked, and now the best greenheart is to be had only farther inland and in the less accessible places above the cataracts in the rivers. This observation



MADE OF GREENHEART

These large dock gates at Wallsend on Tynes, England, are made of greenheart timber imported from British Guiana especially for this purpose.

applies more particularly to the forests along the Demerara and Essequibo Rivers in British Guiana, though it obtains also in part to the regions in Dutch Guiana, where the rivers are not so long and present less formidable rocky impediments. The transporting facilities which the rivers in a country without railroads afford is very



HAULING GREENHEART LOGS

Large quantities of this wood have been regularly exported to Europe for over a hundred years. It is popular for permanent marine structure.

great, even from the extreme sources. The small tributaries are made passable by removing all the dead logs (locally called *tacubas*) which have accumulated for hundreds of years. In some instances it costs almost as much per mile to clean and straighten a creek in the interior as it would cost to grade for laying the ties and rails of a railroad. All the streams are meandering and in a good many places new channels have to be excavated in order to facilitate the carrying of logs. This frequently necessitates the removal of massive trees and old stumps before logs can be carried down stream, which is often done in less than 2 feet of water by chaining one or two logs on each side of a flat-bottom boat locally known as *ballahoo*.

Greenheart wood varies from a greenish-yellow color to dark or nearly black. The heartwood is always darker than the sapwood, though the latter becomes deeper in color upon exposure, and it is often difficult for the inexperienced man to distinguish the sapwood from the heartwood in the sawn condition. The color of the wood is due to the presence of a greenish color substance known as *greenheartin*. It is believed that its

extraordinary freedom from decay is due, at least in part, to the tyloses in the pores of the wood and probably also to the presence of the alkaloid *biberine*. Greenheart has no decided characteristic odor, even in the fresh state. This is contrary to expectation, because a great majority of the trees related to it have wood with very pronounced pungent or spicy taste and odor. The wood is very hard, heavy (about 70 pounds per cubic foot), very strong, though brittle, and exceedingly durable. It is probably the most durable wood known, and is especially valuable, therefore, in a climate like that of tropical America, where the elements favoring decay are so numerous and powerful. Greenheart in the unseasoned state is moderately easy to work, but after it is thoroughly dry it becomes so hard that sawing or nailing becomes difficult. It seasons rapidly and shrinks very little, and, being free from tannic acid, it does not injure iron to any appreciable extent.

Greenheart is said to be one of the strongest timbers in use, with a crushing strength of 12,000 pounds per square inch, 65 per cent greater than that of English oak. The shearing strength parallel to the grain is between 1,800 and 2,000 pounds per square inch. From all the records of tests made on greenheart it appears that it is superior to oak in all its properties, except perhaps in toughness. While the results of the mechanical tests made on greenheart vary considerably, the variation is



SNAKING GREENHEART LOGS BY GANGS OF MEN

not so great as in the case of our white oak, whose properties vary exceedingly according to the locality. Users of greenheart have frequently noticed that logs apparently sound lacked in strength and toughness, and that the darkest colored wood is the most durable. It does not vary so much in density and all of it is very fine-grained and takes a very fine polish. The bulk of the wood that comes to the market is straight-grained. Some of the old trees are curly-grained, locally known as "bull-

forehead," but the logs are frequently defective and the wood difficult to work. The logs are often slightly checked and partly rotten along the pith or center, but if the center is boxed it will not be considered a defect. It is not attacked by white ants in the tropics, and, from long experience, it is learned that the heartwood is proof against the attacks of all marine borers and is superior to every other wood, both in or out of the water.

Differences in quality according to soil, situation, and moisture are often observed. It is commonly claimed that the greenheart from the region along the Demerara River in British Guiana is superior to that from other regions, or that from the basin of the Essequibo surpasses the wood from all other sources. During the last year or two a great deal has been said and written in favor of the greenheart from Dutch Guiana, indicating that it is of greater strength and endurance than that from British Guiana. For these distinctions there is evidently some foundation, but by no means to the extent alleged. There may be a few logs of greenheart from the Essequibo River region that are inferior in strength and compactness of grain and texture to the general run of logs from other sources, but this cannot be said as a general thing. It is true that greenheart obtained from the low, flat land is inferior in strength and durability to that from the moist slopes in the interior above the first cataracts. Indeed, the varying qualities of the greenheart from different regions have long been well known to practical men, but the Demerara and Essequibo greenheart has been generally esteemed the best and always pre-

years, and greenheart has since been the most popular wood for permanent marine structures where durability is highly desirable. Its value for marine works does not consist merely in its durability; another greater advantage is that the wood does not warp or twist after



FIFTY MILES UP RIVER LOADING GREENHEART

This steamer is up the Demerara River, British Guiana, loading greenheart for England. A great deal of the wood is taken out by water in this way.

it is thoroughly seasoned and put in place. A ship planked with greenheart is at all times ready for service, while boats constructed of most American woods often warp and require caulking. Rated as a first-class wood at Lloyds, it is used largely for all kinds of submerged work, such as wharves, piles, docks, and lock gates. It was used in the construction of Nansen's ship, the *Fram*, and the good ship *Discovery*, of Antarctic fame, was built of Demarara greenheart. The dock gates in the Mercy harbor and the lock gates of the Manchester Ship Canal were all built of this wood. The lock gates of the Panama Canal were in part constructed of greenheart from British Guiana, and it has been recommended for the fenders, miter posts, sills, and quoins of the dock gates at Balboa, and also for the keel blocks in these two dry docks. One of the earliest uses of greenheart in this country was for the manufacture of fishing rods, and it is still considered one of the best woods for this purpose.



GREENHEART LOGS AT WISMAR, BRITISH GUIANA

ferred by the English dock builders. The Dutch Guiana greenheart is not used extensively in England and America, and very little is known here in regard to its lasting and other qualities, but the wood has been used successfully in the Netherlands, and eventually will become an important article of export. The bulk of the wood that is now exported from Paramaribo is obtained from the lowlands, and is probably slightly inferior to that from the uplands in British Guiana.

In British Guiana greenheart is commercially the best known and most valuable wood. Large quantities have been regularly exported to Europe for over a hundred

MAKING MAPLE SUGAR

THE New York State College of Forestry is carrying out experiments in the manufacture of maple sugar on its Chittenango Forest Experiment Station. The conditions under which this experiment is being conducted will show, from a small number of trees, the return which can be anticipated from a farm woodlot. Very gratifying results have thus far been obtained and the experiment will be continued for three years more.

THE CHILDREN'S DEPARTMENT

BY BRISTOW ADAMS

FIRE IN THE WOODS



MAY day in 1903, a small boy in Hamilton County, New York, was sent out to find a cowbell which had been lost in the brush at the edge of the field in which the cow grazed during the summer.

This field also furnished a supply of hay to carry it over winter.

Hamilton County is covered almost entirely by the Adirondack Mountains, and is a succession of dense forests and beautiful lakes, with here and there a small farm clearing in between. On all of the maps issued by the Government to show by colors

To make the story short, the boy started a little fire, and before it was out there was no more use for the bell. The fire swept over all the field and burned up the fences; it burned the cow which had worn the bell, destroyed the barn and the hay which had housed and fed the cow, and even the little house in which the boy, his father, mother, and sister had lived. Then it swept on and destroyed acres of beautiful timber. That it did not actually consume the boy himself and his family was due to the fact that they were fortunately able to get into a nearby lake and stay there, almost submerged, until the roaring flames had passed over their heads.



WATCHING FOR FOREST FIRES

The lookout, perched on a high point of the mountain, is able to see miles in all directions. As soon as the smoke of a forest fire is seen, its location is telephoned to the fire fighters in the valley below, and they are soon at work.

how much crops are grown, how much goods are manufactured, or how many people there are to the square mile, Hamilton County appears in a very light shade or even white. Even though it does not take a high rank in crops, in goods, and in number of people, it serves a good purpose as a playground and source of health for all of New York State, and for much more of the surrounding country.

So much for the geography of Hamilton County; now let us return to the small boy who went out to find the cowbell in the corner of the field.

This cowbell was worth 20 cents. When the boy went out to find it he went through the kitchen on his way to the back door, because that was the shortest to the meadow. As he went out he took some matches in order that he might burn away the brush and last year's trash and leaves so that he could the easier see the bell. The fire would not hurt the bell at all and would readily disclose its hiding place.

ALL forest fires are not so damaging; some are much more so. There are many examples of fires in the Lake States, the Rocky Mountain States, and on the Pacific coast, which have meant great harm and the loss of many lives.

But every little fire which goes through the woods does more damage than can be counted. It may be one that will set back the starting of a new forest for several years.



FIGHTING A FOREST FIRE

These men are not trying to quench the flames, but are clearing away inflammable material which lies in the path of this forest fire so that it will quickly burn out for lack of fuel.

Many of the cone-bearing trees, for example, bear good crops of seed only at long intervals, of from five or seven years. Possibly one of these seed years comes when conditions are favorable for the growth of the little seedlings and they spring up all through the woods. Then a spring fire goes through and seems to do no more harm than to burn off the leaf litter of the preceding fall; yet it will kill all of the tender pine trees which have just started. There will be no other seed year for a number of years, and then, when it does come, it is not unlikely that unfavorable weather conditions such as drought will

keep this new crop of seeds from getting started. The trees of the fire year by this time would have been some half dozen years old, and able to survive this lack of moisture; but the new crop, after getting a start, will dry out and die. Then there will ensue another period without seed and no new trees to form the new forest for another half dozen years.

IN the East it is generally considered that the spring is the most dangerous fire season—the time when there is most likely to be damaging fires in the woods. In the West, especially on the Pacific coast, the danger season is in the fall after the long, dry summer. In any case, fall and spring are the times when boys and girls are most likely to go to the woods. Spring calls them to the gathering of wild flowers and to watching the new growths. In the fall, the gathering of nuts and taking farewell of the woods until they shall be in leaf again takes young folks out into the open. These two are the periods when the weather is most delightful and the heat of the sun is not oppressive. Boy Scouts and Campfire Girls, in particular, are likely to “take to the woods” at these times.

Because of their pledges to do a good turn every day and to think of others, because of their interest in woodcraft, and because of their joy in outdoors, the Boy Scout, and the Campfire Girl, and members of kindred organizations have a special duty to see that forest fires are not started by them, and to take pains to put out or get aid in putting out any fire which comes to their attention.

UNCLE SAM through the Forest Service, and the various States through their own organizations, have built up well-planned, well-trained fire-fighting forces, yet it is literally true that these have less effect on the question of forest fires than do the common people, and, in some measure, the boys and girls in our wooded regions. For example, if all the boys and girls in the country were impressed with the idea that no forest fire should be started or if started that it should be immediately put out, there would be no forest fires left for those organizations to cope with except those which might be started in out-of-the-way places by lightning. It is true, of course, that some boys are careless with fire in the woods, and that they go away from camp and leave their fire-places burning, or that they will start to make a fire without clearing from around it light stalks, leaves, and trash which would help carry the flames into the surrounding brush and trees. It is carelessness of this sort that has led to the statement that a boy and a match in the woods is a greater source of danger than a boy with a stick of dynamite in a city alley. In the latter case, the boy may demolish himself and a woodshed or two, but in the former he may lay waste a whole province.

BECAUSE it is the blessed spring time and because you are going to the woods it is particularly necessary that you keep in mind this question of forest fire, and that you realize that only harm is done by them, and that good never can result. Even if the fire did no damage whatever to growing things it would destroy decaying vegetable matter which helps to make a fertile soil and also which is able to hold many times its weight of water as a part of the spongy mass, which on the forest



THE PATH OF A FOREST FIRE

From the burned logs in the foreground to the timber line on the distant snow-capped Mt. Shasta, California, a forest fire swept, leaving desolation and ruin in its path which covered several thousand acres.

floor has a large part in regulating stream flow and in preventing floods on the one hand and low water on the other.

WHEN you build a fire in the woods, hem it in with stones so that it cannot spread; or if there are no stones available, scrape away the duff so that your fire will be on an earth foundation and will not be able to spread past the defensive trenches which you put around it. And before you go into the woods at all memorize this little verse written by State Conservation Commissioner George D. Pratt, of New York, who does not want any more hunting of cowbells with matches in his State.

“Only a man in a forest green,
Only a match that was dropped unseen,
Only a flame—some leaves and wood,
And only a waste where the forest stood.”

THE FOREST FIRE

By CHARLES H. WINKE

On, on, dread Flood of Devastation; sweep
All living things before thee; wrap in flame
The crackling, crashing forest; lay hot claim
On cot and clearing; through the grasses creep
Like angered reptile, hissing; wind-lashed, leap
From blazing hill to flame-swept waters; frame
The very heavens in red, for naught may tame
Thy fury till, too long unmoved, they weep.

Though naught but desolation mark thy train,
Rage on, red King of Ruin!—not for long
Shall thy dire victory remain complete;
With dauntless courage man shall claim again
The ashen waste, and fruitfulness shall throng
Up from the soil in gardens green and sweet.

Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

EDITED BY J. J. LEVISON, B. A., M. F.

THE TREE FAKER

HERMANN W. MERKEL

President American Academy of Arborists

THESE are various kinds of tree fakers. All who have lived in the country will probably remember the appearance at your door of a venerable gentleman, more or less seedy in appearance, who had with him, carefully tucked from sight, a book of chromos, representing the latest atrocities of the color press, alleged to be faithful reproductions of all that was best in fruit and flower, tree and vine. This volume would usually not make its appearance until after the bearer had assured himself that he was talking to the "lady or gentleman of the house," but after that it would be a most diffi-

cult task to get rid of him and his book for a long time, and usually he would take with him an order for a golden elder, a purple-leaved plum, a Carolina poplar, and a Ben Davis apple tree, from all of which deliver us. However, I have no quarrel with this gentleman, for he filled the proverbial long-felt want, and he was really the first propagandist who worked towards the beautification of the surroundings of many dwellings.

The real tree faker is harder to describe. His tribe is large and varied. Sometimes he owns a ladder and a saw as his whole stock in trade. Sometimes he has arrived at the dignity of owning a spray pump, and others have real offices, and get out beautiful literature which is sent broadcast into the hands of an unsuspecting public. Then again he may only own a pot of some mixture, the ingredients of which are a deep mystery to everyone except the mixer, and he won't let the secret out because by means of this mixture, this particular faker is able to cure everything that ever ailed a tree from blind staggers to pip.

I met the work of one of his species one day while in company with Mr. Solotaroff, then of East Orange, when we noticed that a number of beautiful elms on a private place in East Orange, had assumed a reddish bark, and upon inquiry it was discovered that a suave individual had called at this place the day before, and persuaded the owner to let him treat the elms in question by means of a compound which he, the tree faker, had discovered and would paint upon the bark for a consideration. He had stated that he was willing to guarantee that no pest of any kind would ever attack the elms after they had been treated by him, and as a guarantee of good faith, he would collect only one-half the cost of treatment per tree, and come back for the other half the following year. It is hardly necessary to say that he has not yet returned to collect the remainder of his fee.

Another individual, and I think he was the first of his kind that I ever saw, once came to me with a proposition that he would kill any tree that I wanted to get rid of for the sum of one-half dollar. Being pressed as to what means he would employ, he stated that he would bore a hole right into the heart of the tree "where it lived," and then pour in a spoonful of another mystery, which would kill it, and that I could then sell the owner a new tree on which I could make much more than the fifty cents that I would have to pay him.



ALLEGED EXPERTS PRUNED THIS TREE

Tree badly pruned by men who posed as experts. Such trees are common sights in every locality and are a daily example of the need of ascertaining if tree surgeons and tree repairers are competent men.

Of sprayers there are countless numbers, many of them good, honest workers, but unfortunately some that are unscrupulous and will do anything to get money without giving adequate returns. In one case that comes to my mind, I was on an estate with some of the State inspectors, a spraying contractor was working there and came to the owner, with whom we were engaged in conversation at the time, stating that he had sprayed all the maples and elms, and wanted to know whether he should spray the rest of the trees on the place. This privilege, however, was denied him by the owner who had, in the meantime, gotten some information from us. This occurred late in August. There were no pests worth mentioning on any of the trees, at least none that could be controlled by spraying at that season of the year. The owner had found out from us that he was wasting his money, and I believe that the spraying contractor knew it, too, because when I met him later on at the railway station he accused me of trying to take his business away from him. "Butting in," he called it, and when I pointed out to him the error of his ways, he excused himself with the words, "Aw, that fellow has got so much money he won't miss a little of it!" In addition to which he intimated that he would make it worth my while not to interfere with him on other places.

Then there is the individual who makes a specialty of filling up hollow trees, rarely using precautions to prevent further decay, and nearly always willing to operate on trees so old and decrepit that their death is only a question of a short time. The worst case of this I ever saw was on the estate of a prominent New York architect, near White Plains. Here a great many hollow trees, mostly apple trees, had been filled up with loose stones, and the openings covered over with a sheet of paraffin. Needless to say there had been no cleaning or disinfecting, and later on when proper work was finally undertaken on some of the best of these trees, the owner was put to the expense of removing the loose stone filling. Yet this man had been able to collect ten or fifteen dollars a day for his services.

These are all cases in which the operators were ignorant men, but I am sorry to say that there are among the tree fakers many men who know better, and some of the largest advertisers are among the. These will undertake work on old and worthless trees that cannot live, charging outrageous prices for useless work. When the chestnut tree blight was at its worst, I received a letter from a man high in the world of art and letters. You all know him. In this letter he stated that he could cure chestnut blight by the simple means of introducing iron into the sap of the tree, and to prove his theory stated that oaks contained iron which chestnuts lacked, and that oaks were therefore immune.

Another one, a physician, got out pamphlets advertising a "tree serum," though that is not exactly what he called it. This substance to quote from his circular "was introduced into the sap of the tree, and experiments have shown that it is a cure for elm blight, hickory borers, as well as fruit tree blight, and San José scale." This

man got himself into the daily papers, who lauded to the skies both him and his "discovery." In due course of time he came to me, and, as the tree faker has ever been an interesting personality to me, I allowed him the chance



A FINE TREE MISTREATED

This magnificent sycamore tree had a neglected wound which was made worse by a covering of tin. Note the tin partially removed and the whole interior badly decayed. Many trees on the same estate were treated in a similar manner.

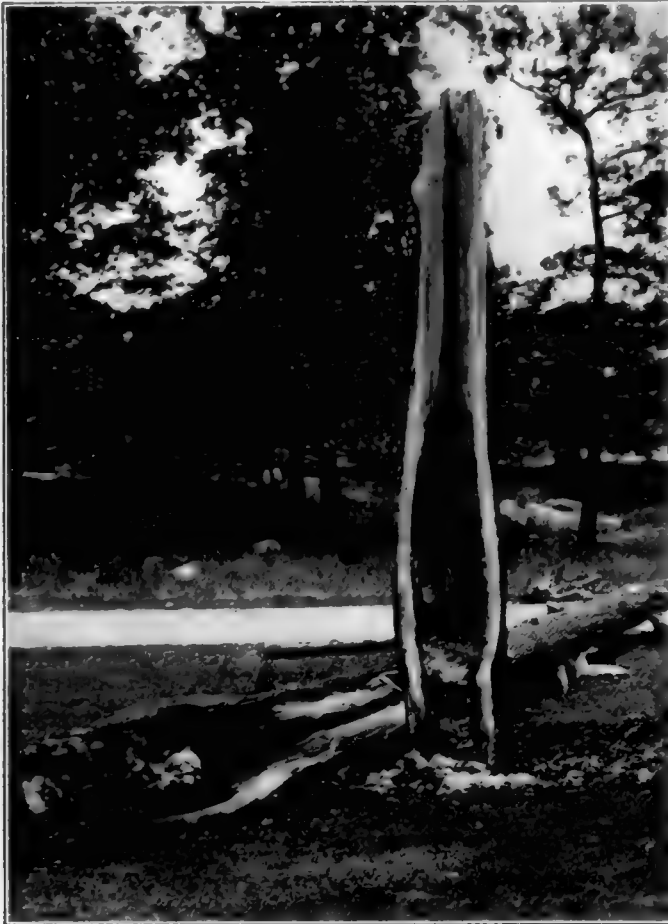
of proving his contentions on a tree of his own selection. He picked a large elm, applied some cans, bored holes into the tree which he connected with the cans by means of a rubber tube, filled the cans with his "dope" and departed. I have not seen him since, but the poor elm still shows four great scars around and below the places where his wonderful serum had gotten in its deadly work.

Quite recently a company has been advertising a wonderful discovery which is applied to the roots. Their pamphlet gives very minute directions, which remind one of the hokus pokus of the ancient alchemists, but it very carefully refrains from mentioning any specific pest or ailment that can be cured, though it shows a number of testimonials.

A faker that I well remember came to me with the information that the chestnut tree bark disease, then at its worst, was all a mistake. In fact there was no such thing. The chestnut trees were being killed by ants, and not by a blight. He had invented a compound that would coax all of these ants out of the ground and trees into the jar containing his "dope," and then they would promptly lose all interest in life. This man was sent to

me by a gentleman of wealth and standing, who had been asked to invest some money in the scheme, and when I stated to my visitor that I would discourage such investment, he became greatly exasperated at first, so that I thought him an honest though misguided person. But I was undeceived before long, for as soon as the inventor had cooled down he offered to go halves with me in whatever he could get.

In closing I cannot, therefore, but warn the tree owner to look into the record of any tree pruner, tree doctor or whatever he may call himself, more carefully than he would into that of a lawyer or physician or veteri-



THIS MIGHT HAVE BEEN SAVED

This tree had its cavity filled with cement and stone without regard to the decayed condition of the interior. Soon after treatment the tree broke apart as shown in the photograph.

arian, before he employs him, for these are examined by the State and governed by laws, and the tree faker is not. Above all, remember that in the profession of arboriculture like that of medicine or law there is nothing of a mysterious character that professional men would not care to give to the world or write about for everyone's use. The forestry departments of many of our greatest universities have gone into the subject of ornamental and shade tree care quite thoroughly, and are always ready to give you their best advice, or, where necessary, recommend the men that will examine your trees or do the work. Ask the city forester or the tree warden, or a professional arborist to give you his advice, and let him employ or recommend a contractor to do the work.

Surely your tree is worth at least as much trouble as your dog or your cow, and if your animals are ill or injured, you would not engage the services of a faker, if good men are available, just because the former sent a solicitor to see you, or because his ad confronted you in every magazine. Shun like poison the man with the mysterious mixture or the *only* methods.

QUESTIONS AND ANSWERS

Q. Will trees grow in our shopping districts?

L. S., *Morristown, N. J.*

A. There is no reason why trees should not grow in your shopping district any less than in the shopping districts of Washington, Paris and other cities. It is all a matter of selecting the right kind of tree, planting it properly, and, later on, watering and keeping the crown compact.

Q. Will the asphalt pavement interfere with the growth of our street trees? Will it be serious enough to kill them?

L. S., *Morristown, N. J.*

A. Asphalt pavement, while to a certain extent interfering with the luxuriant growth of trees, will not be sufficient cause to prevent growth altogether. The streets in most of the large cities are asphalted and still there are trees growing on them.

Q. As a new subscriber, I was examining yesterday the January issue just received. I found a statement that it was possible to kill weeds in a lake by scattering portland cement. The question is of vital importance to me, as I am in general charge of a real estate development upon the brackish waters of the Severn River. We have a beautiful bathing beach whose only drawback is a growth of water-weed. I have tried cutting it out with only limited success. I have been told that a deposit of clean sand four or five inches in depth will be effective, and I have visited places where the beach was absolutely clear for several years after this treatment has been applied. The treatment which you suggest, however, is so much simpler and so much less expensive that I am anxious to know more about it. Is it applicable for brackish water-weed? Is it in any way injurious to fish? How thickly must it be applied?

W. H. M., *Baltimore, Md.*

A. Relative to your water-weed question, while we have had no personal experience with the method, I can quote from a letter received in 1909 from Mr. J. C. Clyde Power, of Los Angeles, who claims to have used it with success. His letter and the series of questions put to him appeared in a bulletin of the American Association of Park Superintendents, and I will send it to you. Our personal experience has extended to destroying weeds by passing through the water a mass of copper sulphate put into a bag and suspended from a string which was held from the back of a boat that passed around the lake, but this method will kill the fish also. Sometimes it is successful to cut out the weeds with scythes. The printed matter may give you other ideas.

Q. In the forest under my care there are a number of historic trees, some of them battle-scarred, which I wish to preserve. Some of these trees are quite old and beginning to show serious signs of deterioration. These, I wish to care for by cleaning, properly treating and filling all cavities. As a member of your association, I take the liberty of asking for such information as may be at your command regarding work of this kind. What I particularly desire to know is the proper chemical to use in painting the wood before filling is made. Some of these veterans have died, and I wish to preserve their trunks standing, as high as 8 or 10 feet. Can you tell me what chemical should be applied to the exterior of these stumps to best preserve them?

D. L. R., *Pittsburg Landing, Tenn.*

A. Trees with decayed cavities should have the latter cleaned out thoroughly and freed from decayed wood; the interior of the cavity should be painted with creosote and then a coating of coal tar. After that, if the cavity happens to be very deep and likely to hold moisture, it may be filled with cement and bricks as set forth in the article sent under separate cover, which will give you a complete description of this sort of work, its remedies and possibilities.

As to the stumps which you want preserved, I would suggest painting those with creosote. This material is the best preservative as well as the least obtrusive looking. Of course, in any of these cases, if the trunks or cavities are so badly covered with fungi that the latter can not be eliminated, it is not worth keeping them because the fungi are bound to turn the wood into dust in course of time.

ADVICE FOR MAY

April and May is the time for planting and because of the short season to do this work all other forms of attention are generally subordinated to the planting work. The following brief notes on planting may, therefore, prove timely.

CARE OF TREES AND SHRUBS ON ARRIVAL

Before the plants arrive, dig a trench from two to four feet wide, one foot deep and long enough to hold them all.

As soon as the trees or shrubs arrive, untie the bundles, keeping each kind separately, and place the plants in the trench temporarily until they can be set out in their proper places. Very carefully cover the roots with earth and give a copious watering. In unpacking the plants, in placing them in the trench, or at any other time, be careful not to expose their roots, even for a moment, to sun or wind, and at all times keep the roots moist.

Check up the number and kinds of plants received and O. K. the lists submitted with the stock.

HOW TO PLANT

1. Determine the location of the plants and prepare the holes.
2. Plant when the frost is out of the ground.

3. Keep the roots well protected from the minute the tree leaves the wagon to the minute it is planted. Do not take off more plants from the wagon than is absolutely necessary.

4. Cut all broken roots and cover wounds with coal tar.

5. Cut back the branches, but do not remove them entirely unless they interfere or are too thick. With some trees like the sycamore or oak or poplar, you can cut back more than with others. Do not cut the leader, and do not cut evergreens.

6. Let only good soil come in close contact with the roots, and have the good soil well packed around the roots; work it in with the fingers and stamp on it. Place the poor soil only on top.

7. See that the tree is planted upright and firm.

8. Plant the tree no deeper than it stood in the nursery.

9. Water the plant only after all soil has been put around its roots and the hole filled.

10. Leave the place clean and do not leave tools behind.

WHAT TO DO AFTER PLANTING

1. *Cultivate and Water.*—It should be borne in mind that when a tree is transplanted, no matter how carefully the work is done it is impossible to take up the entire root system, and therefore, before it is able to care for itself, new roots must be formed to take hold of the soil. In the meantime the moisture is being continually evaporated from the trunk and branches by the action of the wind and sun, and this must be balanced by an artificial supply. During the dry spells and hot weather of the following season, the soil around the base of the tree, for a space wider than the hole, should be stirred up and watered. *Watering during the first summer is very essential and more important than watering during subsequent summers.* The water should not be sufficient to make the ground soggy. Two pails of water applied to each tree on a city street twice a week is enough. On lawns and for smaller trees, the quantity of water will be much less, and in woodland a little water three or four times during the summer is sufficient.

2. *Fertilize.*—In the fall, a layer of old manure or leaf mold, 3 to 4 inches thick, should be spread over the surface around the tree to a distance of a foot or two beyond the lines of the newly filled hole. This treatment will enrich the soil, shade the ground and help to hold the moisture.

NEW STYLE OF FARM GATE

A WISCONSIN lumberman has begun to do his share in the extension of the lumber industry by marketing a wooden farm gate, of a special design, solid lumber, and solid hanging, which is painted yellow with the name of the owner or occupant of the farm in black, with his rural route number. The experiment resulted in the sale of three hundred gates in a single Wisconsin county in one month, and in cleaning up the lumberman's yard of short and almost unmarketable material.

How to Build a Camp Fire

WITH the camping season due there come the usual questions on how to build camp fires. There are several varieties, most of them simple and effective and easily constructed even by a novice in camping. There must be considered not only the kind

Dig a hole about a foot deep and about 3 or 4 feet in diameter. Shovel away the side toward the wind. Lay green poles across the hole to support the pots and pans, and build the fire underneath. (Fig. 1.)

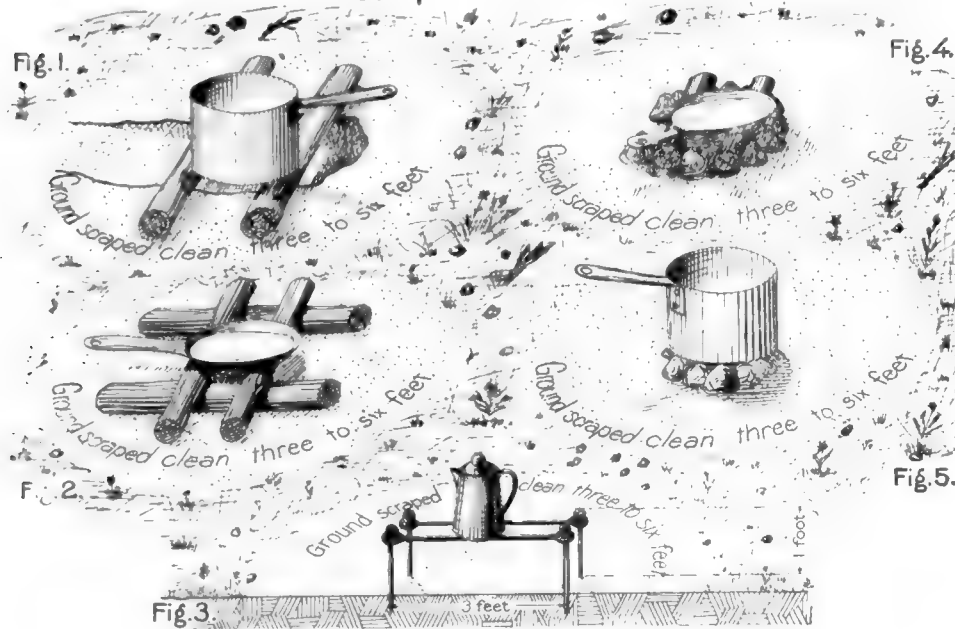
Fire irons are often a great convenience. A piece of three-eighths-inch round iron 4 feet long is bent at right angles a foot from each end and the ends are sharpened. Two of these irons are placed side by side, the ends are driven into the ground and the fire kindled beneath them. Instead of being made in one piece, the pegs and cross-bars may be connected by rings in the ends. (Fig. 3.) They will then fold and be easier to pack.

Camp fires should never be larger than necessary, and the utmost care should be taken to prevent sparks from being carried into the neighboring forest. Clear away the litter for a considerable space about the fire. And be sure to *put the fire out* before you leave it.

A shovel is nearly as important a tool as an ax in camping. Do not count on finding one along the way, but put one in your outfit.

During wet weather look for kindling in burned sugar pine or yellow-pine butts or in pine knots. The under

Camp Fire-Places.



of camp fire which gives the best service but the kind which is least dangerous. The man who is careless with his camp fire should not be allowed in the woods for all too frequently he is responsible for forest fires which do tremendous damage. The Forest Service has issued a hand book for campers in which the following excellent instruction regarding camp fires is given.

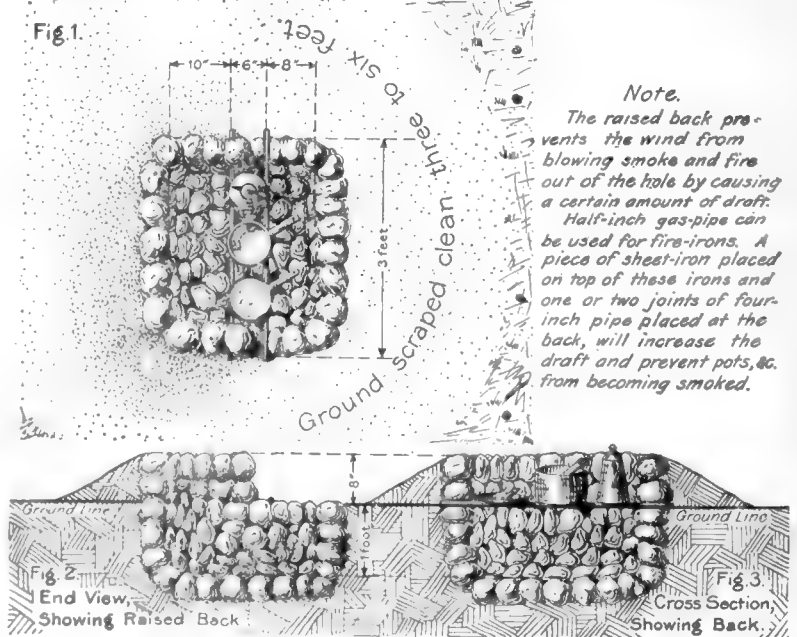
Camp stoves should be taken whenever they can be transported. They are safer than open fires, more convenient, require less fuel, and do not blacken the cooking utensils. Collapsible sheet-iron stoves may be obtained.

In the absence of a stove an open fire must be built. A safe and serviceable fireplace can be made of rocks placed in a small circle so as to support the utensils. (Figs. 4 and 5.) Where rocks are not obtainable, poles may be used as in Fig. 2.

For permanent camps it pays to build a stone fireplace. One is shown in the illustration. A piece of sheet iron will prevent the blackening of the pans and makes a better draft.

For temporary camps the fire should be built as follows:

Details of Camp Fire-Place Construction.



side of a leaning tree will usually contain dry material. Dead branches—of manzanita, etc.—that have not yet fallen are drier than those on the ground. Bark from fir snags is excellent fuel.

Where matches are scarce or when the weather is stormy, first light a candle and kindle your fire from that.

Hints on fire protection are always timely and fit particularly well with these instructions about camp fires.

The first thing is prevention. Bear in mind the Six Rules. Be particularly careful with camp fire, matches, and tobacco, since carelessness with these is punishable by law.

Scrape all inflammable material from around the fire before lighting it. Make a fireplace either by digging a hole or by piling up rocks. The fire will then not only be safer but will draw better.

Before leaving camp see that the last spark is extinguished. Pour water on the embers and then cover them with earth.

Don't make your fire too large. Large fires are not as convenient to cook by as small ones and are more trouble to put out.

If you discover a fire, go to it at once and put it out if you can. A small fire can be put out easily by throwing handfuls of earth, sand, or dust at the base of the flame. The flames may also be beaten down with sacks or with branches, but care must be taken not to scatter the fire.

If the fire is spreading too rapidly to be attacked directly, cut and scrape a trail some distance ahead of it. Do not back-fire; this is work for an experienced man. If a fire is serious enough to require this treatment, the work should be left to a ranger.

The best tools for fire fighting are the shovel, ax, and hoe or rake. In open pine forest very little ax work will be required. Shovel or rake a trail through the needles down to mineral soil, and guard the trail.

To stop a fire burning in brush the trail must first be cut with the ax and then scraped. The brush should be thrown to the side away from the fire. The litter may be scraped toward the fire.

Pick a route for the fire trail that will avoid brush patches if possible. The crest of a ridge is an excellent location, since the fire naturally checks at the top.

Do not give up because the fire is gaining headway or because you lack tools. The fire has already been reported by lookouts, and rangers are hurrying to it properly equipped. Stay and help them; and in the meantime do what you can to keep it in check.

See that a fire is cold before you leave it.

Report all fires to the nearest forest officer.

Do not suppose that because a fire is merely burning in apparently worthless brush it is therefore doing no damage. Such fires are often the most serious.

CHESTNUT BLIGHT DAMAGE

THE chestnut blight has already done damage estimated as close to \$50,000,000. The disease attacks both American and European species, but does little damage to those from Japan and China. Plant

breeders, by crossing Japanese chestnut and native chinquapin, have produced resistant trees. Some of the Chinese chestnuts are said to grow 100 feet high in their home forests.

THE TWIN BEECH TREES

ON the Jacob Purlee farm, four miles south of Salem, in Washington County, Indiana, a natural curiosity which is always attracting a large number of sightseers is twin beech trees. The



A NATURAL CURIOSITY

Twin beeches on the farm of Jacob Purlee in Washington County, Ind. The limb forming the perfect union is 20 feet above the ground.

limb that binds the two trees together is 20 feet from the ground and forms a perfect union between the two trees.

HOUSES FOR RURAL TEACHERS

A MOST interesting scheme for social service, one affecting every hamlet in the land, has been instituted by the National Lumber Manufacturers' Association, in the proposal to build a home for every rural school teacher in America. Louisiana will be one of the first states where the plan will be carried into effect, and a thorough investigation of the conditions in that state preceded the announcement of the social service plans of the lumber manufacturers. The association has not as yet formulated its plans for pushing this new department of public service by actually assisting the schools of the nation to build homes for teachers, but work on this philanthropic enterprise is already under way and the association plans to have its plans ready for announcement in a few weeks.

Wood Preserving Department

BY E. A. STERLING

Ex-President American Wood Preservers' Association

THE city of Minneapolis, which already has a larger percentage of creosoted wood block streets than almost any other city in the country, has recently given further evidence of its conviction that this form of pavement is best by contracting for an additional 350,000 square yards. The blocks are to be of yellow pine, 3½-inch deep, creosoted with 16 pounds of oil per cubic foot. It is reported that the contract price for the blocks is \$1.46 per yard. This is an increase of 14 cents per yard over the 1915 prices in the same city and represents higher prices for lumber and creosote. The value of the total order will exceed half a million dollars, the blocks will require 1,000 cars for transportation, and will be equivalent to over 12 million feet board measure of lumber. This amount of block will pave 22 miles of 27-foot roadway. It is stated that Minneapolis has expended over a million and a quarter dollars for creosoted wood block pavements in the last thirteen years, and the total cost for maintenance has been less than a thousand dollars, which is practically negligible.

Increasing attention is being given to the preservative treatment of farm timbers, and the lumber used around homes, both suburban and rural. While fence posts have been treated to quite an extent for many years, the application of practice has not been very widely applied to lumber and small timbers. This is partly for the reason that suitable creosote or other preservatives have not been available in retail quantities, and in part because the possibilities have never been properly promoted. The sills and basement flooring of many farm buildings, entire structures in the case of swine houses, poultry houses, board walks, gates and many other essential farm structures can be treated at reasonable cost so as to give greatly increased life from decay. A gradually increasing amount of literature is being made available, among which may be mentioned Bulletin 158 on Preservative Treatment of Fence Posts, issued in August, 1915, by the Agricultural Experiment Station, at Ames, Iowa. Previously a bulletin on the same subject was printed by the Maryland Agricultural Experiment Station, and the National Lumber Manufacturers' Association now has a bulletin on the Preservative Treatment of Farm Timbers on the press. It is also understood that the Forest Service has compiled additional information of a very complete character, which will be published in the near future.

That the American Wood Preservers' Association is vigorously carrying out its policy of developing standard treating practice, and giving educational publicity to the wood-preserving industry, under the new administration, is indicated by the energetic work of the Executive Committee in outlining projects for the present year. New appointments have been made on the various standing committees, and the personnel insures the greatest

possible activity and the best results. Special attention is to be given this year to educational publicity, both of the methods and results of proper preservative treatment, and of the aims and benefits of the association. At a dinner of the Executive Committee, standing committee members, and others in Chicago, in March, President Carl G. Crawford outlined the policies which he expects to carry out, and called on the various men present for an expression of their views.

Creosoted wood blocks, already extensively used as paving material for city streets, have been coming into use as flooring for the last four or five years, according to the Forest Service. Its durability, noiselessness under heavy traffic, and sanitary properties are its chief advantages for paving and also give it special value for making floors, especially for use where heavy trucking, the moving of heavy machinery, or other severe use makes the maintenance of floors a serious problem. Its rather high cost is its chief disadvantage. Wood block is now widely used for flooring in factories, warehouses, machine shops, foundries, various types of platforms, wharves, and docks, and for such miscellaneous purposes as hotel kitchens, hospitals, laundries, and slaughter houses. Possibly one of the oddest of these uses is for the floors of wild animal cages and runways. Notwithstanding the recent increase in the use of wood block for these purposes, it is believed that the growth of this industry will be even more rapid in the future. These floors are well liked by the workmen because they are easy on the feet.

Most of the blocks for these floors are now made of southern yellow pine. Hemlock, larch, Douglas fir, black gum, beech and maple are also used. The blocks are sawed from long sticks of timber and are treated in huge steel cylinders from 6 to 7 feet in diameter and 100 feet or more in length. Creosote oil is run into the cylinders and pressure is then applied to force it into the wood. The oil is a product obtained in the manufacture of coke from coal and its purpose is to prevent decay of the wood, and also to prevent shrinking and swelling of the floor after it is laid.

According to statistics just compiled jointly by the American Wood Preservers' Association and the Forest Service at Washington, D. C., there was treated at 102 plants in the year 1915 a total of 141,858,963 cubic feet of timber, which compares with 159,582,639 cubic feet by ninety-four plants in 1914; a decrease in quantity of about 11 per cent in 1915. Of the 1915 output, cross ties contributed 78.4 per cent of the total, construction timbers, 8.3 per cent, paving blocks, 5.4 per cent, piling 4.4 per cent, poles 1.7 per cent, and the balance consisted of cross arms, lumber, etc.

With the exception of two years, 1913 and 1914, the volume of timber treated in 1915 was the largest on record.

Lumber Uses

BY WARREN B. BULLOCK

A CENTRAL exhibit of the commercial woods of America, with diagrams and models to show the manner in which the various woods may be used, is planned in Chicago by the lumber associations of America. There will be similar building exhibits in other cities, for which the plans are nearly completed in Detroit and San Francisco.

The general display in Chicago will be chiefly of a permanent nature, and will be installed as part of the Building Material Exhibit in the Insurance Exchange. The exhibit is being so planned that any builder can at once get an idea of the character and uses of every commercial wood in America. It is planned to make a collection of woods, in different finishes, to a total of literally thousands. All sorts of finishes will be shown, and various types of construction.

There will be cases containing hundreds of panels of wood, in the natural finish, and in stains. There will also be for the building engineers an exhibit of treated and untreated woods, good and bad structural material, giving visual examples of what kinds of wood to select for various building purposes. One of the striking displays will be a large model of a heavy timber mill constructed building, showing floors, roof timbers, posts, girders, and all the interior work on a factory building of large size.

There will be several models of farm buildings, and also of four frame houses to cost from \$2,000 to \$8,000, preferably for homes in the city, for that is where most of the spectators at the exhibit will come from. Sidewalks, creosoted block roads, models of garages, and chicken houses, will also be provided. One exhibit will be of large-sized specimens of structural material and other such phases of the industry will be shown.

It is the biggest part of this plan, however, to copy this exhibit on a less extensive scale in every large city in the country, to provide information for prospective builders. There will be the permanent exhibits, and then there will be also special exhibits, which will be sent from city to city to be shown for a week or possibly a month at a time, bringing special building points to the attention of possible builders.

Speaking of farm buildings, such as will be shown in model or diagram in this building exhibit, the National Lumber Manufacturers' Association has just completed the first two of a series of nine bulletins on farm buildings of various types, which goes into detail on the construction of practical buildings about the farm. The first two bulletins are on implement sheds, and grain-storage buildings, two of the most important, but most neglected buildings about a farm.

K. J. T. Ekblaw, of the University of Illinois, author of these bulletins, estimates that a fair average life for

farm machinery allowed to stand in the open is five years. He says that farmers who care properly for their machinery can get from twenty to twenty-five years' use of the same type of machinery. He figures, therefore, that on an average investment of \$1,000 per farm for machinery, the building of an implement shed for \$250 will save the farmer \$1,800, or rather, give him an investment representing \$1,800, gauged by its savings. He says that the growing use of the small tractor on the farm increases the necessity for a well-built implement shed. The bulletin gives storage space dimensions for the various items of farm machinery, with suggestions on the technical side of the building problem.

In the same author's bulletin on grain-storage buildings, he brings out that while economy in construction is a main factor in the building of implement sheds, strength is of the utmost importance in the building of granaries. The problems of pressure on walls, the foundation strength, floors and framing, are all given due consideration. The use of solid materials, the right sizes and grades of lumber, it is asseverated, will avoid the complaints against the old style buildings made of wood not of the best, and not erected on the basis of strength of every timber in the construction.

Though the building exhibit is only planned, it has already been selected as the meeting place of the newly organized Home-Makers' Guild, of Chicago, founded by Mrs. T. Vernetta Morse, widow of a former well-known middle western lumberman, an organization which is affiliated with the National Vocational Art and Industrial Federation.

The University of Washington has just held a unique exhibition, in the demonstration for the general public and the men in the industry as well, of woodcraft, mining and road and trail building. A sawmill fed by a sky-line logging apparatus was in actual operation, and the problems of forest-fire fighting were exemplified. The day of April 13 was open house at the university, and several of the colleges in the university vied for the honor of giving the best showing. The forestry building was shown to visitors with a typical camp fire, sawmill, with apparatus for swinging logs across the country in the air. The operations were carried on as they are in the real woods, and the lumber showing was concluded with a demonstration of how the forest products can be utilized in building, showing finishes and construction work.

Last month, the writer told of the manner in which birch was coming to be used for the manufacture of gunstocks, taking the place of the traditional black walnut. Since that number of AMERICAN FORESTRY was issued, there has come to hand an article showing how birch is being used for fuse plugs for the shells sent to

Europe for use against the trenches of the German armies. Fuse plugs are used to protect the threads of the fuse socket, and to close the powder compartment of a loaded shell, when in transit, and when on the battlefield the shell is about to be used, the plug is removed and the threaded fuse substituted. Bronze, steel or other metals were formerly used for these plugs, but the Canadian manufacturers especially have been coming to use birch instead. White and yellow birch, beech and maple are all used, with white birch in the lead, because these woods do not change in size with the changes in climatic conditions.

At present, owing to the suddenly developed demand, these fuse plugs are not being made on automatic lathes, but this type of lathe is being developed to enable larger quantities to be turned out. Including the felling of the tree there are seven steps in the making of these plugs. As against the mining, smelting, refining, molding and casting of the metal plugs before the work of manufacture is fairly under way, the wooden plug offers amazing economical gain, even with a smaller cost. The finished plugs are shipped to the ammunition factories in bags containing 1,000 plugs each.

The branding of lumber is spreading throughout the nation at a rapid rate. This is the greatest modern development of the industry, and is advancing so rapidly that the lumber associations can hardly keep up with the demand for "certified timber."

"Make Every Timber a Promissory Note."

This is the phrase which is carrying the trade-marking idea into every part of the land. It is the talking exemplification of the new spirit among lumbermen to standardize lumber, make it a recognized quality product, so that architects will not be afraid that their specifications will not be carried out. The spread of the "certified lumber," was shown at a recent conference in Chicago, when it was found by a poll of the secretaries of various lumber organizations, that every association in the country was either considering branding its output, or was already doing this branding.

The United States will have a lumber exhibit at the Paris Reconstruction Exposition, which opens May 1, and in which the French, with a preparedness attitude which might well be duplicated by American lumbermen, in their fight for the retention of their proper place in the building industry, are beginning to plan for the rebuilding of the sections devastated by the war. The exhibit in Paris will be made by the Southern Pine Association, and will be in charge of that association's foreign representative, but while essentially a southern pine exhibit, will be so displayed as to portray generally the possibilities of American lumber. In its arrangement it will be a general American exhibit, not merely of the southern states. Three typical farm buildings, and a small mill-constructed building will be among the most striking features in the exhibit.

PURPOSE OF ARBOR DAY

"ARBOR Day is being perverted in too many States into a mere day for the inculcation of the aesthetic side of tree and bird life. Arbor Day has a bigger purpose, a bigger scope. It should be observed from the economic side as well as the aesthetic and artistic." This is the declaration of State Superintendent of Instruction C. P. Cary, of the Wisconsin school system.

"Arbor Day should teach conservation of the forests, both for the future timber supply of the nation," he says, "as the second industry in importance in America, as well as for the protection of the head waters of our rivers. Arbor Day should do more, it should teach the use of lumber in a way that the school children can understand, so they will realize the importance of trees, as well as their beauty.

"I find on looking over the Arbor Day literature of many States that Wisconsin stands practically alone in this recognition of the dual purpose of Arbor day. For several years past we have taken advantage of the day to teach the children of the State the value of trees, the uses of lumber, conservation as well as tree-planting, and the great principles of the conservation of the forest for the future needs of the commonwealth. We do not overlook the artistic side of the day, and I do not believe that many States issue a more artistic Arbor Day publication than that of Wisconsin. But we also teach the children the use of timber, the value of a tree, not alone its beauty for giving shade in the city, but its use in the forests and how every daily habit involves the use of something of wood.

"We have gone deeply into fire prevention, and in the last two years have broadened our work in this line. We have begun to teach the children that the way to conserve the forests is not alone to prevent forest fires and wasteful cutting of timber, but also to prevent the burning of houses by carelessness in the home. Every house that is burned means that many trees must be felled to provide the lumber for a new home.

"When I say that other state school departments should teach the economic side of the tree, I am advocating, therefore, what we are already teaching in Wisconsin."

A CREDITABLE PUBLICATION

THE *Empire Forester*, an annual publication, by the student body of the New York State College of Forestry at Syracuse, N. Y., has just been published. It contains very interesting articles written by students, graduates and eminent foresters, and is amply supplied with cuts to illustrate the articles. The cover design, together with the general makeup of the magazine, reflects great credit on the representatives of the student body in charge.

PLAN FOR TREE EXHIBIT

In its work of cooperating with the General Federation of Women's Clubs, this department of AMERICAN FORESTRY has prepared the following outline of a plan for an exhibit in ornamental and shade tree work, to be held in New York City in May, 1916:

VALUE OF TREES

1. Streets without trees and streets with trees—photos.
2. A home with and without trees.
3. Example of a tree providing shelter to mothers and children.
4. Specimen trees showing beauty of trees in all seasons.

PLANTING

1. Photograph and transparencies showing specimen trees of best varieties.
2. Showing streets properly planted with suitable trees.
3. A model showing an ideal shade tree and methods of planting.
4. Chart showing detailed cost of planting a shade tree.

PRUNING

1. Specimens showing proper pruning and results of improper cutting and failure to cover wound with coal tar.
2. Photos showing trees and streets badly pruned and improperly pruned.
3. The best tools used in pruning trees.

INSECT ERADICATION

1. Cases illustrating, with actual specimens, the life histories of some of the most important insect pests, as the Tussock, Browntail and Gypsy moths, the Leopard moth, etc.
2. Model spraying apparatus from well-known makers.
3. Chemicals used in spraying.
4. Photos showing spraying work in cities.
5. What the children may do to help insect eradication.

DISEASE ERADICATION

1. A neglected wound showing fungus growths.
2. A treated wound.
3. Collection of most important fungi.

CITY FORESTS

1. Photos showing the City Forests of the Country and how they are being developed.
2. Photos showing City Forests abroad.

MUNICIPAL PARKS

1. Best park views.
2. Utilization of parks by the people—park recreation.

STATISTICS

1. Chart showing the number and appropriations of shade tree commissions, Park Departments, etc.

EDUCATIONAL

1. Collection of city tree ordinances.
2. Best books, magazines, pamphlets, etc.
3. Circulars on Children's Tree Clubs, Arbor Day Celebrations, etc.

THE WOOD FLOUR INDUSTRY

MORE than twenty thousand tons of wood flour, valued at \$300,000, are used annually in the United States in two widely different industries, the manufacture of dynamite and the manufacture of inlaid linoleum. Wood flour is also used in making composition flooring, oatmeal paper, and in several other industries. It forms one of the means by which the huge waste product of our lumber mills is beginning to find some better means of disposal than the burner. Since a total of 36,000,000 cords of such waste is produced each year at sawmills in the United States, of which about one-half goes into the furnaces as fuel, while the rest is burned as refuse to get rid of it, there is no lack of raw material for industries which can develop ways of turning this waste to account.

Two methods of producing wood flour are practiced, one using millstones, the other steel burr rollers to pulverize the wood. The latter requires only one-fourth as much power to operate as the former and was developed on the Pacific Coast to handle sawdust as a raw material. The mills of Norway which produce much of the European wood flour are of the stone type.

Wood flour mills are scattered over the country from Maine to California wherever the proper combination of wood and water power is available, and the domestic wood flour competes with the Norwegian product which, before the European war, was delivered at Atlantic ports for \$12.50 to \$15 per ton.

LARGE SALES OF NATIONAL FOREST TIMBER

BIDS were recently accepted by the Department of Agriculture for two large bodies of National Forest timber estimated to contain 188,100,000 board feet. One is in California and the other in Utah. With one exception, these are by far the most important sales made this fiscal year, which is expected by forestry officials to run considerably above last year in receipts from timber sales, the first five months having shown an increase of nearly 40 per cent. The California sale is on the Plumas National Forest, in the Sierra Mountains. The most valuable timber is sugar pine, for which \$3.25 per thousand was bid, with an estimated total of nearly 26,000,000 board feet on the tract. For yellow pine, of which the amount is put at over 37,000,000 feet, \$2.60 was bid.

The Utah timber is in the Wasatch National Forest, and will be cut chiefly for railroad ties. It comprises, according to the Government's estimate, 82,100,000 board feet of green and dead lodgepole pine, Engelmann spruce, and Alpine fir. The sale price is 10 cents for each tie cut and one-half cent per linear foot for mine timbers.

Editorial

THE FAILURE OF LOUISIANA'S FORESTRY POLICY AND ITS REMEDY

LOUISIANA was the first of the southern States to enact a forest fire law, and has at all times shown more public interest in forestry than any other southern State. For many years the State Forestry Association has held successful annual meetings. Forestry measures have been proposed from time to time and the State has a law levying a tax on the timber cut by lumbermen which brings in many thousand dollars annually. It was the original belief and intention of those who advocated this measure that the sum thus raised, or its equivalent, should be spent in furthering the forestry interests of the State, and in this way derive from the destruction of the forests the means for at least partial restoration of this great natural resource.

That the forest wealth of the State, and the industries dependent upon it, are doomed to disappear under present methods need not be emphasized—it is only too apparent. In spite of the enormous reproductive power of the commercial pines which form such a large percentage of Louisiana's output, nearly all of the second growth timber occurs, *not* on cutover pine lands, but on farm land turned out or abandoned, most of it in the period shortly after the Civil War. Everywhere fires destroy the young pines as rapidly as they spring up, due to the large amount of grass and weeds on such lands, and incessant burning. Under present policies, Louisiana's forests are doomed.

Let it not be urged that forest destruction is a blessing in disguise, opening up lands to agriculture and increasing the population and wealth of the State. The most prosperous States are those with a diversity of industries, and the most desirable economic condition for a community to attain is a true balance between agriculture and forestry, in which each farm has its woodlot, each town and county its public forest areas, with larger tracts in poorer or hillier sections in State or national ownership. The utter neglect of the immense potential value of lands for timber production—a value shown throughout the South by the pay rolls of the lumber companies—would be inexcusable folly.

Yet in spite of the urgency of the case, and the interest so widely shown, what has the State of Louisiana actually done for forestry? Practically nothing. This condition demands an explanation, and we find it, strangely enough, in the very spirit of progressiveness which unfortunately led the State into the adoption of a form of State organization fundamentally defective. In 1910 Louisiana responded to the then new, and widely heralded expansion of the forestry movement to include the conservation of all forms of natural resources, and created a State Conservation Commission, which not only superseded the old Fish and Game Commission, but

undertook to administer the mineral resources, and the forestry laws of the State as well. For revenue, they had the income from fishing and hunting licenses, and from the timber tax. They had *permission* by law to appoint a state forester, but Louisiana is without a state forester today.

Universal experience in state forestry in this country has shown that the amount of progress which a State makes is gauged by the educational efforts it puts forth in forestry, and that trained or educated foresters are the only effective agents for conducting this propaganda. A second powerful reason for employing a technical forester of experience is found in the need for a proper solution of the many problems arising in state forestry—problems of taxation and legislation, problems of fire protection, and of securing natural reproduction. These must be worked out on the ground by men trained to observe, broad-minded and constructive in their mental processes.

Why has not the Conservation Commission of Louisiana provided the State with a forester, when for six years they not only have had it in their power to do so, but have been repeatedly urged to this course by the Forestry Association and others? As late as April 1, 1916, the Commission, through its chairman, made the statement that they had decided that the appointment of a forester was necessary, but unfortunately the funds of the department were at such a low ebb that they were unable to finance it until later in the year. And this is the last of a number of similar verbal assurances extending over several years.

To come back to our first statement, it is not the intentions of the Commission which are the cause of the trouble—the form of the organization itself is wrong. The reason why out of all the funds at the disposal of the Commission, no money can be found for forestry, is that such a commission, wherever found, invariably places fish and game protection, minerals, waterpowers and what not, ahead of forestry in their consideration. This is natural and logical. Fish and game appeal directly to more people, being in an immediate revenue in licenses, and are good politics. Forestry looks to the future, requires idealism and present self-sacrifice. There is nothing in forestry for the politician, nor can he ever hope to deliver the goods. Therefore, he fights shy of it. A mixed commission means the death knell of forestry, unless it is already so strongly entrenched that it is able to survive the blighting tendencies of such supervision or neglect.

There can be no hope of real progress in Louisiana forestry until the State has divorced its forestry work from the present Conservation Commission, and placed it in the hands of a nonpolitical State forestry board.

This board should be adapted to Louisiana conditions, but, following precedents of other efficient and successful State boards, it should probably be composed of about five men, who receive no salary, but only their expenses and a per diem, when engaged in the Commission's work. The personnel of the board *must* be non-political and interested and informed on forestry. To secure such a board, at least three of its members should be men whose occupation especially qualifies them for the position. Louisiana has such men,—for instance, the presidents of state educational institutions, the Professor of Forestry at the Louisiana State Agricultural and Mechanical College, or others. An admirable plan is to authorize the State Forestry Association to nominate one of the members of the board, and to secure the cooperation of the lumber industry by permitting them a similar nomination through the most representative State association. On a fairly large and well constituted board the governor might be included as an *ex officio* member, but he should not be given unlimited power of ap-

pointing the remaining members. This will remove the temptation of converting the board into a political asset.

This board should appoint the State Forester, who need not be a member of the board but should be the secretary and executive officer. It should be provided by law that the forester must be a technically trained man, educated in his profession and with some experience in actual practice of forestry. This board should be given for forestry purposes an amount equivalent to the income derived from the State tax on timber products.

When this step is taken, further progress is assured. Until it is done, all the energy and enthusiasm which may be brought to bear upon the subject will be dissipated in the sands of political indifference and inefficiency, and another decade will see the State with vastly diminished forest resources, the end of the industry practically in sight, and nothing accomplished to restore the economic balance or replace the forest as one of the leading resources of the proud queen of the South.

\$3,000,000 APPROPRIATION NEEDED

IN a few days, when the House Agricultural Appropriation Bill comes up for consideration in the Senate, there will be presented Senator Gallinger's amendment to it. This amendment provides for an appropriation of \$3,000,000 to continue the purchase of forest lands in New England and the Southern Appalachian states for the protection of the headwaters of navigable streams. \$8,000,000 of the \$11,000,000 appropriated by Congress five years ago under the so-called Weeks Law, for this purpose, have been expended, but the remaining \$3,000,000 reverted to the Treasury because the period for using it lapsed before the necessary legal arrangements for purchasing the land desired could be completed.

There is every reason why this \$3,000,000 should be reappropriated to continue the work for which it was intended. The Forest Reservation Commission, having charge of the purchase of the lands secured under the Weeks Law, has recommended the continuation of the work, so has Secretary of Agriculture Houston, and so do individuals and influential organizations throughout, not only New England and the Southern Appalachian states, but the entire country.

The American Forestry Association and cooperating organizations have been actively advocating this measure for some time, and have recently requested members of the Senate to give their attention to the amendment when it comes up. This amendment will be referred to the

Senate Committee on Agriculture and Forestry, and it is believed will be reported favorably and will likely pass the Senate. If it does it will go before the Senate and the House conferees and it is hoped may then be presented to the House for a vote. The measure however has already been unfavorably reported by the House Agricultural Committee, by a vote of 8 to 7, and the action of this committee will of course have considerable weight with the House.

At the same time the inclination of Congress to economize in every possible direction, the press of much important legislation, and the desire to get as much business as possible completed before the Republican and Democratic conventions are held all tend to prevent this very important forestry measure getting the full consideration to which it is entitled.

Every member of the American Forestry Association is therefore asked to aid in the effort to secure the favorable attention of members of the House to this amendment. They are asked to write personal letters to members of Congress from their districts, pointing out the importance of continuing the purchases of forest lands at the headwaters of the navigable streams in New England and the Southern Appalachians, and urging them to give their personal attention to the Gallinger amendment providing \$3,000,000 for this purpose.

Members of the Association are requested to do this *NOW*. In a few more days it may be too late. Action is requested *AT ONCE*.



They Like American Forestry

"You certainly are to be congratulated on the new numbers of the AMERICAN FORESTRY magazine. Not only is its appearance and form greatly improved; but the division into classified departments is a distinct and notable improvement in itself. There is no doubt that the magazine, in this new form, will increase not only in its circulation, but in its usefulness as well."

JOHN M. BRISCOE,
University of Maine, Orono, Maine.

"When the announcement was made a few months ago that a change would be made in the size of AMERICAN FORESTRY, I was not favorably impressed, for I thought it meant another magazine in cumbersome form. When I received the August number I was greatly pleased with the improvement in the illustrations and the general makeup of the publication. All the numbers since then are also equally satisfactory. I feel that it is due you that I admit the error of my first impression regarding the change of form of the magazine, and that I give you whatever encouragement you may derive from the expression of my satisfaction in the improvement which has been made in this publication."

J. P. KINNEY,
Washington, D. C.

"I am delighted with AMERICAN FORESTRY in its new form and think both you and the Association should be complimented on the excellence of the get-up and of the matter and arrangement. It is most interesting."

ELLWOOD WILSON,
Grand Mere, P. Q., Canada.

"I am glad to take the opportunity of offering my congratulations upon the splendid magazine you are now turning out, and I hope it is receiving the additional support which it deserves."

ARTHUR SMITH,
Reading, Pa.

"I am certainly delighted with the new magazine."

T. D. HOBART,
Pampa, Texas.

"I like the improved magazine very much indeed. Keep the good work up."

L. D. SWEET,
Denver, Colo.

"I am reading the AMERICAN FORESTRY MAGAZINE with the greatest interest and admire its very beautiful pictures and very good articles."

COUNT LOUIS AMBROZY,
*Piazza San Marco, 51, Palazzetto,
Venezia, Rome, Italy.*

"Your magazine is elegant in its way, and constantly improving."

C. B. FILLEBROWN,
*77 Summer Street,
Boston, Mass.*

"We wish to commend you for the splendid work you are doing and the improvement made in the magazine."

THE LOUISIANA RED CYPRESS Co.,
*Hibernia Bank Building,
New Orleans, Louisiana.*

"AMERICAN FORESTRY is a very interesting and instructive paper. I enjoy reading it as much as a Forester does."

I. D. VAN VALKENBURG,
Johnstown, N. Y.

"The magazine has improved wonderfully during the past year, and I believe the Association has also become more effective than ever."

H. R. CHRISTIE,
Forest Branch, Victoria, B. C., Canada.

"Am delighted with AMERICAN FORESTRY, which gets better and better month by month. Here's wishing you every satisfaction and success in your work this year."

J. R. DICKSON,
Forest Branch, Ottawa, Canada.

"We congratulate you upon the magazine you are editing."

EVERITT G. GRIGGS,
*President, St. Paul & Tacoma Lumber
Company, Tacoma, Washington.*

"I just can't resist wanting to reproduce your whole magazine every time a copy reaches my desk, all of the stories are so interesting. We are reprinting the extracts in all our editions—English, Spanish, Portuguese and French—so you can see that AMERICAN FORESTRY is spreading its good work over the entire hemisphere."

FRANKLIN ADAMS,
*Editor, Pan-American Bulletin,
Pan-American Bldg., Washington, D. C.*

"I have for some years been reading your magazine, AMERICAN FORESTRY, and the insight on forest conditions in this country and subjects relative to them has amply repaid me."

ROBERT H. FORMAN,
Washington, D. C.

"Surely you are to be complimented and congratulated on the wonderful improvement that you have brought about in the AMERICAN FORESTRY MAGAZINE. Each number for the past year has shown a marked advance, but your last number stands out as the most readable and most attractive magazine one would want to pick up."

E. CASSIDY,
Philadelphia, Pa.

"We read your magazine every month, and we are very much pleased with it and congratulate you on the work you are doing."

GEORGE W. HARTZELL,
*President of the George W. Hartzell
Lumber Company, Piqua, Ohio.*

"Permit me to congratulate you upon the very great improvement that you have given your readers in the late issues of your magazine. It has so many excellent, helpful and inspiring features I cannot begin to enumerate them; I can only express my sense of deep personal gratification and approval and wish you unbounded success such as your efforts truly merit. I gladly endorse every word and sentiment so beautifully expressed by Mrs. Emmons Crocker in a recent edition."

CHARLES S. MANN,
Harboro, Pa.

Book Reviews

Irrigation in the United States, by Ray Palmer Teele, 253 pages. Price \$1.50. D. Appleton & Company.

Because of the poverty of authentic information for the prospective land buyer, the purchase of advertised irrigated lands or irrigation securities has been looked upon as a doubtful venture. Realizing the great need of reliable information on the subject, Mr. Teele, who has been connected with the U. S. Government's investigations of irrigation for sixteen years, has prepared this book for the benefit of persons contemplating settlement in the arid sections of the country, and in its provides just the information the prospective settler should have. The author discusses climate, water supply, crops, laws, water rights, securities, organization, and finances, all from the standpoint of the intending purchaser of lands, water rights or securities. The book contains also a large amount of statistical matter relating to irrigation taken from the report of the thirteenth census and other Government reports, showing the results of the various Federal and State laws relating to irrigation, such as the desert land law, Carey Act, reclamation law, and irrigation district laws.

The Holy Earth, by L. H. Bailey. 171 pages. Price, \$1. Charles Scribner's Sons.

Dr. Bailey, of Cornell University, contributes another volume to the series of valuable books from his pen. In this he presents his personal views, formed by many years of thought, study, and contact, of man's relation to the soil, both physical and spiritual. That is, he treats of the practical questions involved, such as the conservation of resources and the like, but in such a way as to arouse the sense of the basic character of nature with respect to intellectual and spiritual as well as physical life; and to do this he reveals rare poetic gifts of vision and expression, employing them in such a way as to make the reader not only understand but feel the truth.

A Thousand Years of Russian History. By Sonia E. Howe. J. B. Lippincott Co., Philadelphia. Price, \$2.50.

The authoress, who is a Russian by birth, the wife of an English clergyman, and a prominent member of the Russian society, offers in this volume a review of Russian history dealing with civic and national life, as well as with the political annals of the empire and its rulers; a connected series of pictures of the Russian nation at various stages of its growth, drawn in the hope of interesting readers in the real story of Russia's past. The numerous illustrations, in color and by a special gravure process, have been carefully selected from the archeological treasures of Russian libraries, in order to illustrate, as far as possible from contemporary sources, the life, manners, and customs of the people, while the territorial growth of the empire is illustrated by a series of maps.

Canadian Department

By ELLWOOD WILSON

Secretary, Canadian Society of Forest Engineers

Mr. H. R. MacMillan is now in Calcutta, India, investigating conditions and markets and will proceed from there to China and Japan.

Mr. R. H. Campbell writes that the activities of the Dominion Forest Branch will continue along the same lines as last season.

A. H. Unwin, of England, writes that he is going to Nokling, via Lagos Nigeria, Africa, for the next twelve months.

B. K. Ayers writes from Ansonia, Connecticut, where he is forester for the Ansonia Forest Products Company: "That circular letter should prove a good idea. Business is very good with us, particularly so on account of embargoes on the N. Y., N. H. & H. R. R. which shuts out lumber shipments from connecting lines both north and south. There is an immense volume of war business in this immediate section, as there are large brass mills of all sorts outside of the strictly munition works of Winchester and Marlin at New Haven, Remington and Lake Torpedo at Bridgeport, and Colt's at Hartford. The whole Naugatuck Valley is one large brass center and is working overtime. At the same time that prices are good and orders plenty for lumber, wages have increased for both teams and men."

R. C. Sweezy writes from the Royal Military College at Kingston that he is carrying on a detailed survey for M. J. O'Brien in the Upper Ottawa, area 1,125 square miles and that he gets away occasionally from his military duties to see how his parties are progressing. Recently he made a brief examination of the limits of the Mattagami Pulp and Paper Company in Northern Ontario.

G. H. Gutches, superintendent of The New York State Ranger School, has resigned, and will return to the Dominion Forest Service.

P. Z. Caverhill, forester for the Province of New Brunswick, is preparing his plans for a forest survey of that province and has mapped out a most excellent scheme. Mr. Caverhill will make a trip to Grande Mere in April.

R. R. Bradley, of the New Brunswick Railway Company is preparing his final maps of the territory owned by that company, and expects, in the spring, to undertake planting operations on a large scale.

Henry Sorgius, manager of the St. Maurice Forest Protective Association, made a trip to Michigan to attend the meeting of the Northern Forest Protective Association. Sorgius is very busy with his plans for the season's work and is equipping a gasoline speeder and a Ford automobile with the new pump designed by Mr. Johnson, of the Dominion Railway Commission. Circulars are also being sent out to the settlers explaining to them the changes in the fire laws and asking their cooperation.

Ellwood Wilson is going to Syracuse on April 1 to lecture to the students of The New York State College of Forestry.

A. C. Volkmar, forester of the Riordan Paper Company, St. Jovite, Quebec, has been elected an associate member of the Canadian Society of Forest Engineers.

Roy L. Campbell, secretary of the Canadian Pulp & Paper Association, did a great deal to make their last meeting the wonderful success it was.

George Chahoon, Jr., president of the Laurentide Company, Ltd., is going to spend the month of April with F. A. Sabbath, vice-president of the Laurentide Power Company, at Hot Springs, Virginia. Mr. Chahoon is an enthusiastic golfer, and Mr. Sabbath is a tennis player of no mean order.

B. M. Winegar, of the C. P. R., reports that he will begin the planting of trees for snow sheds along the eastern lines of that road.

Arnold Hanssen, of the Laurentide Company, Ltd., has been busy all winter clearing off the flood basin of the River St. Maurice, about to be flooded by the company's new dam, hauling the wood and trying to dispose of it to the best advantage.

Prof. R. B. Miller, of the University of New Brunswick, has been getting out some very creditable reconnaissance maps made by his students.

H. R. Christie, of B. C., is going to Ottawa for the purpose of enlisting.

In the issue of "El Correo Espanol" of March 7, published in Madrid, there is an article commenting on the scarcity of paper and urging the founding of a Forest Products Laboratory modeled on that at McGill, to which it pays high tribute.

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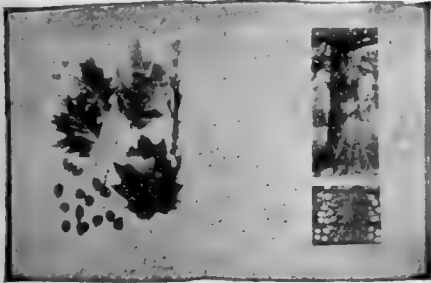
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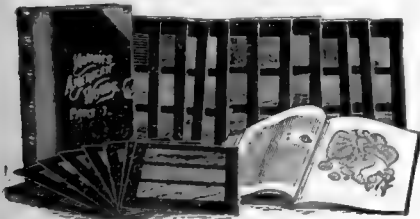
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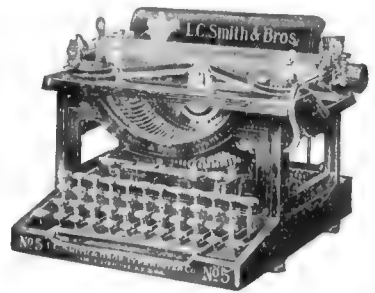
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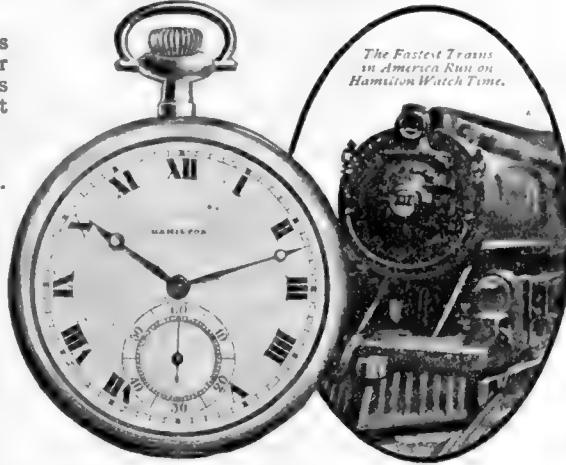
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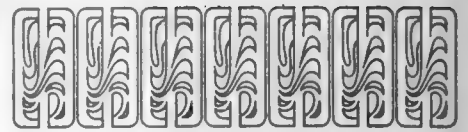


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Vol. 22

JUNE, 1916

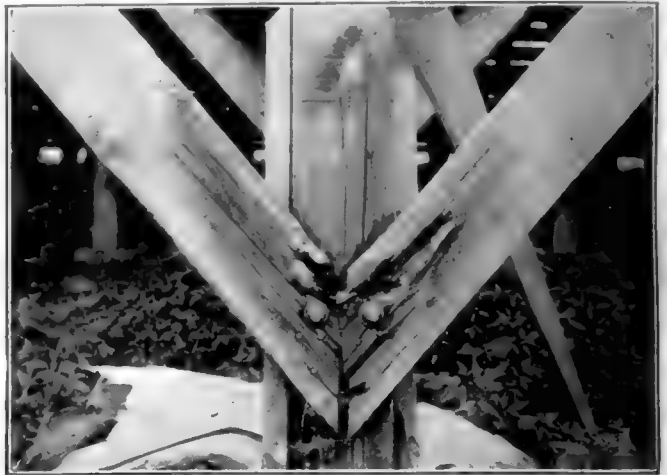
No. 270



JUN 27 1916

THE REDWOODS

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Decay in braces at joint where moisture tends to collect. (Courtesy of U. S. Forest Service)

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"Commercial Creosote is also very apt to contain small amounts of water, which cause the oil to boil over when heated. In regular vacuum treating plants, these features of Commercial Creosote make no difference, but in field work they form troublesome obstacles.

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The Magazine of the American Forestry Association

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June, 1916. Vol. 22

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American Forestry

VOL. XXII

JUNE, 1916

No. 270

The Redwoods

Identification and Characteristics

BY SAMUEL B. DETWILER

Father, Thy hand

Hath reared these venerable columns . . .
. . . They stand, massy, and tall, and dark,
Fit shrine for humble worshipper to hold
Communion with his Maker.

—Bryant.

THE Bigtree, sometimes called the giant redwood (*Sequoia Washingtoniana*), and the redwood (*Sequoia sempervirens*), are the most magnificently proportioned trees in the world. So impressive are the forests of these gigantic trees that they are justly ranked among the chief natural wonders of America. There are a few trees in the world that have attained greater diameters and some that grow to greater heights, but no other tree with a trunk of huge size rises so gracefully to the majestic height of the Sequoias.

Sequoia, as the Bigtree and Redwood are classified botanically, is an Indian name given in honor of Sequoyah, the inventor of the Cherokee alphabet. Ages ago, Sequoias grew in what is now the Arctic Zone. Today only two kinds of Sequoias are in existence and their nearest living relative is the bald cypress, found in the Southern United States.

The principal body of redwood extends through the coast region of California to Monterey County, and some grow in the extreme southwest corner of Oregon. It is rarely found further than 20 to 30 miles from the ocean and is limited to localities where heavy sea fogs are frequent. It grows principally on the western slopes of the coast mountains from sea level to 2,500 feet elevation, or in the southern part of its range, up to

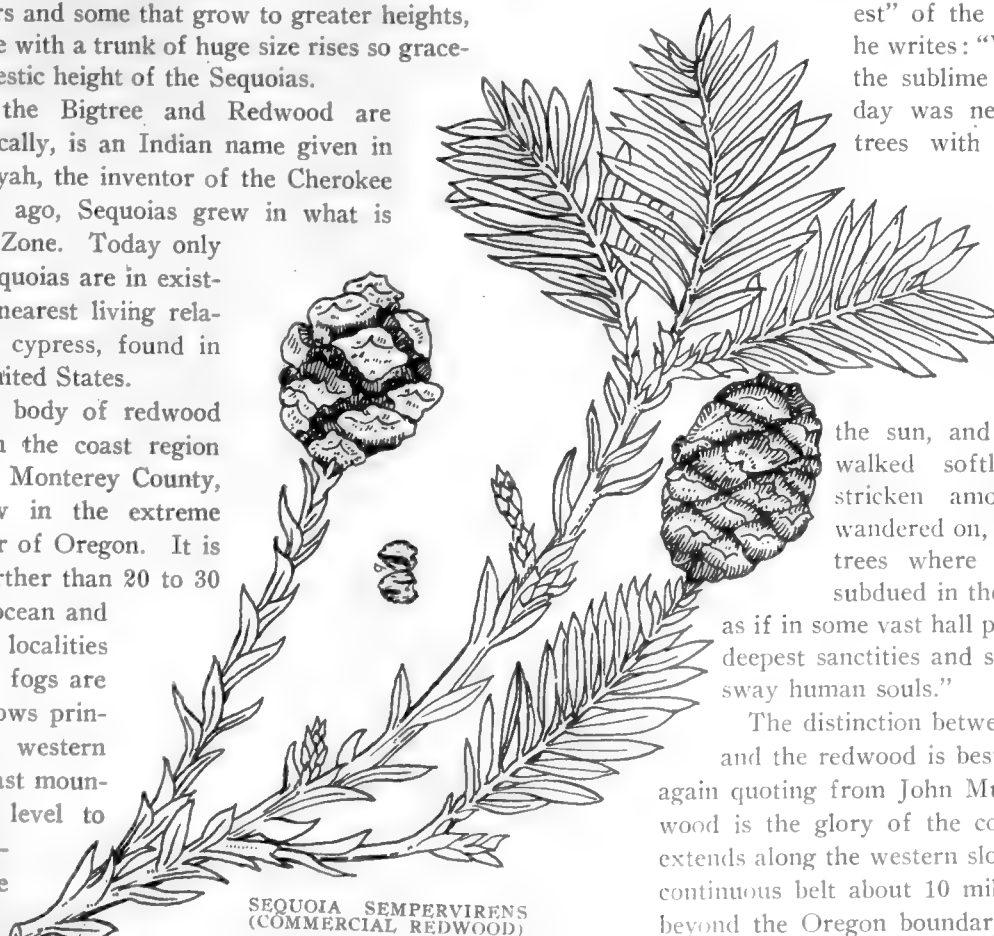
3,000 feet, but not at higher altitudes. The Bigtree is confined to about 50 square miles of territory in central California, on the western side of the Sierra Mountains. Other kinds of trees are numbered by the millions, but the Bigtrees are so rare that a list of trees of any considerable size would contain but few thousand entries. Except for occasional stragglers, the Bigtrees are grouped in small groves or well-defined forests as indicated in the table accompanying this article.

These venerable trees inspired John Muir, and to him we are indebted for words that express the profound emotions felt by thousands who have viewed these mighty lords of the forests and learned that "there may be worship without words."

Describing the "Giant Forest" of the Kaweah basin, he writes: "When I entered the sublime wilderness the day was nearly done, the trees with rosy, glowing countenances seemed to be hushed and thoughtful, as if waiting in conscious religious dependence on

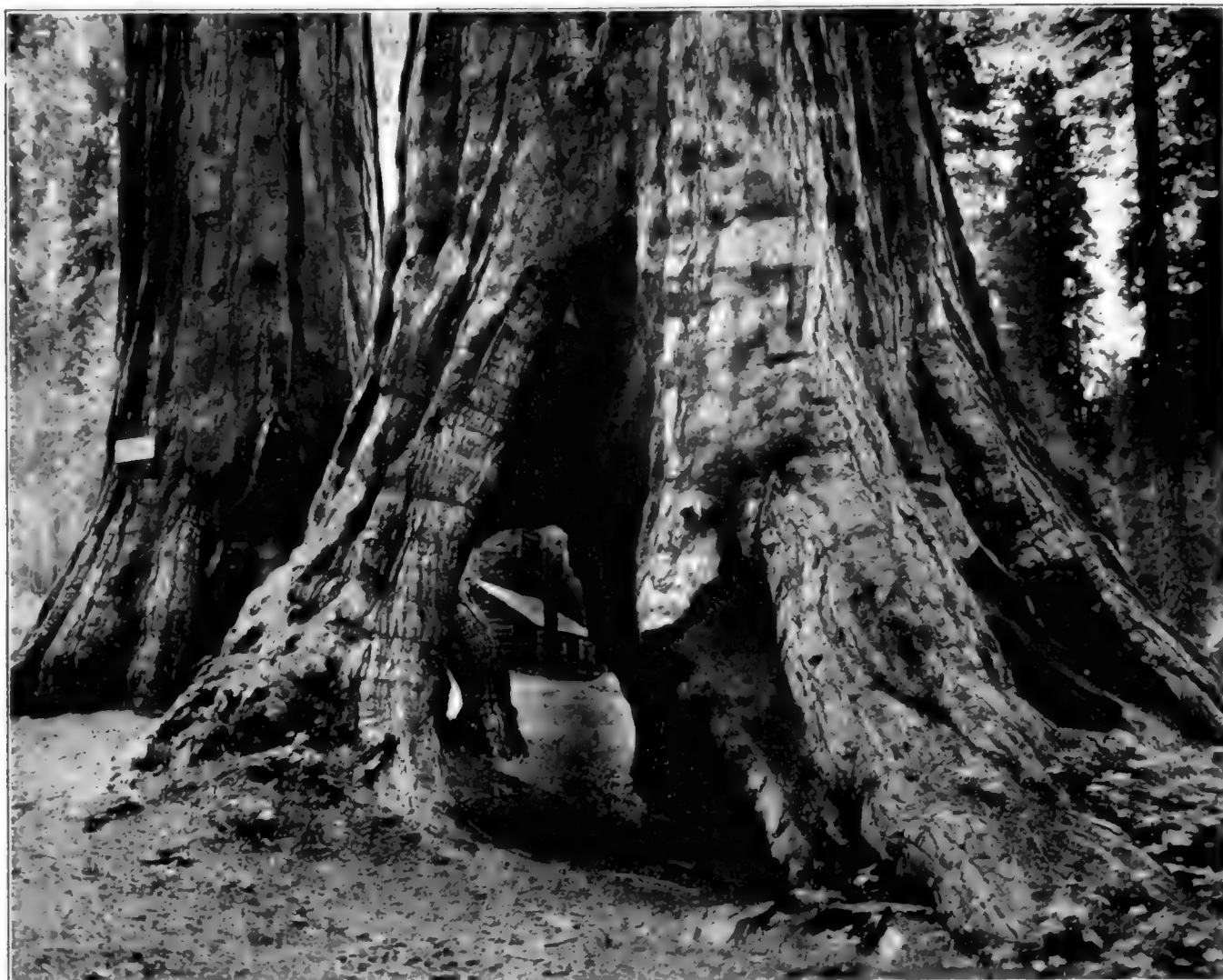
the sun, and one naturally walked softly and awe-stricken among them. I wandered on, meeting nobler trees where all are noble, subdued in the general calm, as if in some vast hall pervaded by the deepest sanctities and solemnities that sway human souls."

The distinction between the Bigtree and the redwood is best impressed by again quoting from John Muir: "The redwood is the glory of the coast range. It extends along the western slope, in a nearly continuous belt about 10 miles wide, from beyond the Oregon boundary to the south of Santa Cruz, a distance of nearly four



SEQUOIA SEMPERVIRENS
(COMMERCIAL REDWOOD)

Showing a branch with cones attached, the seed and the leaf buds



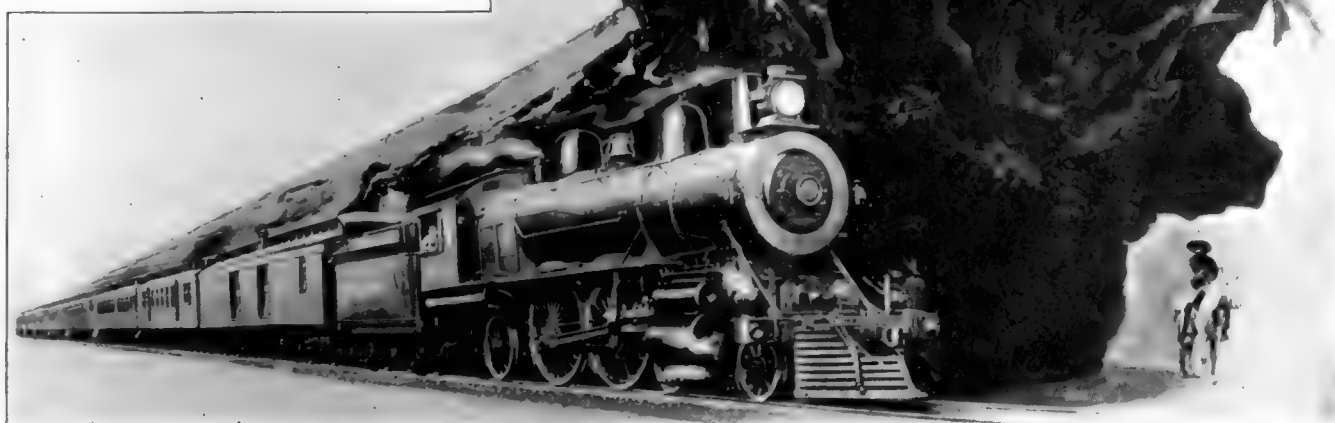
THE OHIO AND HAVERFORD IN MARIPOSA GROVE

These two giants are among the most notable trees in the grove. The view of the cabin through the opening in the base of the Haverford, and the whole condition of this tremendous base is not only most impressive but most convincingly indicates the great age of the tree and of its mates.

BIGTREE GROVES

<i>Name</i>	<i>Location</i>	<i>Ownership and approximate size</i>
North Grove	Placer County, Cal.	Private. 6 trees
Calaveras Grove	Calaveras County, Cal.	Private. 102 trees
Stanislaus Grove	Tuolumne County, Cal.	Private. 1,380 trees
Tuolumne Grove	Tuolumne County, Cal.	Private. 40 trees
Merced Grove	Mariposa County, Cal.	Private. 100 trees
Mariposa Grove	Mariposa County, Cal.	Government. 545 trees
Fresno Grove	Madera County, Cal.	Private. About 2,000 trees, many cut
Dinky Grove	Fresno County, Cal.	Government. 170 trees
Converse Basin Forest	Fresno County, Cal.	Private. About 10 sq. mi., mostly lumbered
General Grant Grove	Fresno County, Cal.	Private and Government. 262 trees
Redwood Mountain Forest	Tulare County, Cal.	Private. Several thousand trees—partly lumbered
Sequoia National Park	Tulare County, Cal.	Government and private. Eleven groves and more than 7,000 trees.
Tule River Forests	Tulare County, Cal.	Private. A large area; partly lumbered.
Dry Meadow Grove	Tulare County, Cal.	Government, small area.
Deer Creek Grove	Tulare County, Cal.	About thirty large trees.

hundred miles, and in massive, sustained grandeur and closeness of growth surpasses all the other timber woods of the world. Trees from 10 to 15 feet in diameter and 500 feet high are not uncommon, and a few attain a height of 350 feet or even 400, with a diameter at the base of 15 to 20 feet or more, while the ground beneath them is a garden of fresh, exuberant ferns, lilies, gaultheria, and rhododendron. This grand tree, *Sequoia sempervirens*, is surpassed in size only by its near relative, *Sequoia gigantea*, or Bigtree, of the Sierra Nevada, if, indeed, it is surpassed. The *sempervirens* is certainly the taller of the two. The *gigantea* attains a greater



COMPARISON OF A GIANT REDWOOD AND A RAILROAD TRAIN OF EIGHT CARS

Most of these wonderful trees, which are so large that they have been dignified by individual names, are about 250 feet in height. The Grizzly Giant, with its broken top, is 204 feet, while the Columbia is 204 feet. Many are between 80 and 90 feet in girth at the base and some few over 90; and the diameter at the base is between 20 and 30 feet for the larger ones.

girth, and is heavier, more noble in port, and more sublimely beautiful. These two Sequoias are all that are known to exist in the world, though in former geological times the genus was common and had many species. The redwood is restricted to the coast range, and the Bigtree to the Sierra."

The greatest size of the Bigtrees is 300 to 330 feet in height, and a diameter, 10 feet above the base, of 30 to 27 feet. Exceptionally large specimens of the redwood are 325 to 350 feet high and 18 to 20 feet diameter, 10 feet above the base. Ordinarily, the Bigtree does not exceed a height of 250 to 280 feet, and a diameter, above the swollen base, of 12 to 17 feet. The usual size attained by the redwood is 8 to 12 feet in diameter and 190 to 280 feet in height. For about 10 feet above the ground the trunks of both the redwood and Bigtree are fluted and much enlarged, but above they are well rounded, with an even taper.

Until several hundred years of age, Bigtrees growing in the open have branches the entire length of the trunk. The slender branches droop gracefully, curving upward at the tip. The young tree forms an attractive pyramid of dense foliage, broad at the base and tapering to a sharp tip. As old age approaches, the trunks are practically branchless for 80 to 125 feet or more. The remaining

branches are massive, and curiously twisted. The top is open, irregularly rounded and picturesque. In open forest, the largest redwoods are free from branches for 50 to 60 feet, and where the trees stand close together, it is 80 to 100 feet to the first limb. Young redwoods may have branches extending to the base, forming a slender spire. Old trees have rounded or flattened tops, heavy-branched, open and irregular, appearing small in contrast with the great height and size of the trunk.

The bark of young trees has an attractive purplish shading. Large sequoias have cinnamon brown bark, with deep furrows between wide, rounded ridges. The outer surface is tinged with gray and covered with fibrous scales but small checks, crosswise, disclose the inner bark of brighter red. The bark of the Bigtree has a lighter reddish tinge than the redwood. Both trees have exceedingly thick bark. A mature Bigtree is protected at the base by bark 1 to 2 feet thick; a large redwood may have bark 6 to 12 inches or even a foot, in thickness.

The redwoods are evergreen trees, with bright, deep green foliage. The leaves remain on the trees three or four years after they develop. The redwood has two forms of leaves. On the lower side branches and on young trees the leaves are about one-half inch long,

narrow, flattened and with stiff, sharp points resembling a small lance. These leaves arrange themselves along the opposite sides of the branch into a flattened spray.

The second type of leaf is scale-like and sharp-pointed; these closely overlap each other. When they die they turn reddish-brown and cling to the branch a year or two before falling. These leaves occur irregularly on the branches and vary considerably in size, some being short and closely pressed to the branch, others longer and with tip pointing outward. The leaves of the Bigtree vary considerably in size but all are sharp-pointed and uniformly scale-like, much like those of the cedar, but longer and with more of an outward spread at the tips. The redwood has small oval buds covered by loose scales; the buds of the Bigtree have no covering of scales.

Late in the winter while the snow is still on the ground, the Sequoia flowers appear. The pollen bearing flowers are little scaly bodies about a quarter of an inch long, borne singly at the tip of the twig. These tiny, pale-yellow flowers are inconspicuous until they begin to send out clouds of bright yellow pollen. The seed-producing flowers are also borne singly at the ends of the twigs. At first they are small and pale green, but they mature into egg-shaped cones composed of thick woody scales closely packed together. Four to seven little brown seeds, surrounded by small gauzy wings, are borne under each cone scale. The cones remain on the trees until early winter; in the meantime the seeds are gradually shed. The cones of the Bigtree are larger than those of the redwood, sometimes being more than 3 inches long, and they require two years in

which to ripen their seed. Redwood cones are about an inch long and ripen in a single season.

The Bigtree bears heavy crops of seeds every few years, and the seed has moderately strong germinating power. Contrary to general belief, it is not uncommon to find Bigtree seedlings. The seed grows best where a forest fire has burned the refuse and exposed the bare soil; under such conditions, an average of 9 to 10 seedlings per square foot has been found. Under favorable conditions, the seedlings may reach a height of 6 feet in as many years, and at 40 years old it may grow to be 60 feet high and a foot in diameter. Its ordinary growth is much slower, but it continues developing steadily for centuries. By counting the rings, it is known that the Bigtree may reach the age of at least 4,000 years, and it is thought by some that the age of some of the trees now standing may be 5,000 years. The Bigtree does not thrive at any stage of its growth if it does not have an abundance of sunlight, and prefers to grow on cool, moist, sandy or rocky soils, but at times it is found growing on dry slopes and ridges.

The Bigtree is at home between the elevations of 5,000 to 8,000 feet above sea level, where the temperature may fall to 12 degrees below zero or rise to 100 degrees (F.) and the annual rainfall may range between 18 and 60 inches. It seldom grows alone; its usual companions are sugar pine, white fir, and in the northern part of its range, Douglas fir. At lower elevations western yellow pine and incense cedar grow with it.

A single Bigtree may contain more than 100,000 board feet of lumber. Twenty of the largest trees in the Cala-



A STURDY ROAD SENTINEL.

For ages before the road was built this great tree stood sentinel on the hillside awaiting the coming of man who built the road. It so brought its lordly form within close view of the traveler.

veras Grove were estimated to contain an average of 81,386 board feet each, the largest tree being estimated to contain nearly 120,000 board feet. Unverified estimates of trees that would yield four times this amount of lumber are reported. The weight of the largest Bigtree was estimated to be in excess of 1,000 tons.

The secret of the long life of the Bigtree is its freedom from destructive fungus and insect enemies. Fire may gradually burn away the wood at the base of the trunks if it finds an opening in the thick bark. Lightning frequently shatters the tall tops, but the Bigtree has power above all other trees to recover from such injuries it may receive. Occasionally the roots are undermined and the settling of the huge trunks may cause the tree to be overthrown, but apparently most failures are due to the weight of the enormous limbs which grow on the sides where light is most abundant and which may gradually cause the trunk to lean and finally fall. The Bigtree has been widely planted in Europe and grows well. It is adapted to conditions in the Eastern United States, as is shown by healthy specimens of good proportions which are growing in Pennsylvania and New York. Great care in selecting the proper soil is undoubtedly necessary if this tree is to be grown successfully.

The redwood produces large quantities of seed but only one out of four or five is perfect and capable of producing a seedling; for this reason it is not common to find dense stands of young redwood seedlings, and most of the new growth of redwood is from sprouts from the stumps or roots. Some species of pine produce small sprouts from the stumps after the trees are felled, but the redwood is the only cone-bearing tree that depends on this un-

usual power as the principal means of perpetuating itself in the forest. Redwood sprouts grow very rapidly and may develop in 30 years into trees 16 inches in diameter, 80 feet high, and yield 2,000 board feet per acre. Seedlings grow more slowly than sprouts and need a greater amount of sunlight.

The sprouts from the redwood stumps may live in dense shade for a century, growing slowly, and then when the trees above them are removed, spring into vigorous growth. The redwood requires a moist climate for its growth. Few trees grow outside the region where sea fogs are frequent and heavy, and in such cases the trees are small and scattered. In the region in which it grows the temperature rarely falls lower than 15° F. or rises above 100° F., with a rainfall of 20 to 60 inches. About 50 square miles of forest is composed almost entirely of redwood trees. On about 1,800 square miles the redwood comprises half to three-quarters of the stand, the other species being principally Douglas fir with some tanbark oak on the upper slopes, and with western hemlock and western red cedar on the lower slopes.

The redwood reaches its best development on moist, sandy soils, and does not grow in extremely wet or boggy situations. Exposed to the winds on dry soils or steep slopes the trees are smaller and less numerous, Douglas fir quickly taking the place of the redwood. The yield of merchantable lumber from a redwood forest is very large. Although 400,000 board feet per acre is an exceptional yield, a cut of over 1,000,000 feet per acre is on record. A single tree is said, on good authority, to have cut logs that scaled a total of 66,500 feet board measure. The ordinary acre yield is from 10,000 to 75,000 board feet.



IN CALIFORNIA REDWOOD PARK

Even with such a comparison as is shown in this photograph it is difficult for those who have not actually seen the big trees to realize how awe-inspiring and impressive they are.

Redwood lumber is clear red-brown in color. It is light in weight and varies in grain from fine to coarse. It has a high value commercially because of its exceptional durability, its resistance to fire, the ease with which it is worked and the large size of clear lumber which it furnishes. It is also highly prized in the tropics because it is one of the few woods which white ants do not attack. The wood of the Bigtree is of less weight and strength than that of the redwood, but so closely resembles the latter that it is sold under that name. The lumber is bright rose-red when first cut, but in time becomes a dark reddish-brown. It contains much tannin and resists decay to a remarkable degree.

The redwood tree has no enemies except forest fires. It is very long-lived, but the Bigtree attains a greater age. A redwood 20 feet in diameter, 350 feet high, was found to be 1,000 years of age, another tree 21 feet in diameter was 1,373 years old. The redwood has been planted as an ornamental tree in Europe, but in the United States it has so far been little used. It is a very beautiful tree, surpassing the Bigtree in gracefulness of form and in the attractiveness of its foliage. Although it is very exacting in regard to conditions of soil and climate, it thrives near Charleston, South Carolina, and it is probable that it can be grown in many other places, but the chances for its successful growth are much less than the Bigtree.

New Yorkers and visitors to that city may gain an idea of the size of the Bigtrees by examining in the American Museum of Natural History a circular slice cut straight across the grain of a Sequoia Gigantea, whose trunk was 16 feet in diameter or 50 feet in circumference. Placed in a horizontal position, says Garrett P.

Serviss in his description of it, this huge section would form a round table at which 20 or 25 persons could comfortably sit. Its area is 200 square feet. It would cover a large room. A similar section of the biggest oak or elm or pine or sycamore or tulip tree that grows in the Eastern states, placed beside it, would resemble an old-fashioned 3-cent silver piece beside a -trade dollar.

"Yet this imposing specimen of the 'big tree' is really undersized. The average diameter of a fully developed Sequoia is 25 feet, and a section from a tree like that would be nearly 80 feet, instead of 50, in circumference. At least one sequoia has been cut down whose diameter was almost 31 feet and circumference 96. That tree was 302 feet in height. The average height is 275 feet, but a few attain 350 to 400 feet. Still, the Sequoia is not the tallest tree in the world, though it is by far the largest or most massive. The eucalyptus trees of Australia exceed it in height, but are more slender.

"There is a feature of the exhibit in the museum that adds greatly to its effect. Beginning at the center or heart of the tree, a series of figures continued outward to the bark indicates the lapse of the successive centuries during which the giant was growing. Every year a 'ring of growth' was formed, and a hundred of these rings, of course, fill the space of a century on the section. The rings are plainly seen, but so crowded that the eye could not count them but for the aid afforded by the grouping into century periods.

"From this it appears that the tree began growing in the year 550 of the Christian era—at the time when Justinian was emperor—and continued until it was cut down in 1891."



THE GRIZZLY GIANT COMPARED WITH A CHURCH

This tree, the famous Grizzly Giant in Mariposa Grove, Yosemite National Park, is 204 feet high; 93 feet in circumference and 29 feet in diameter at the base; 64 feet in circumference and 20 feet in diameter at a point 10 feet above the ground.

Redwood Lumber and Its Uses

REDWOOD lumber was first cut in an extensive way about fifty years ago. Prior to that time the Spaniards and Russians in California used a little of it, but when the gold fever was at its height, the early American settlers made considerable use of this valuable lumber. Although the redwood forests have already been heavily cut, it is probable that 50,000,000,000 feet can still be produced before the supply is exhausted.

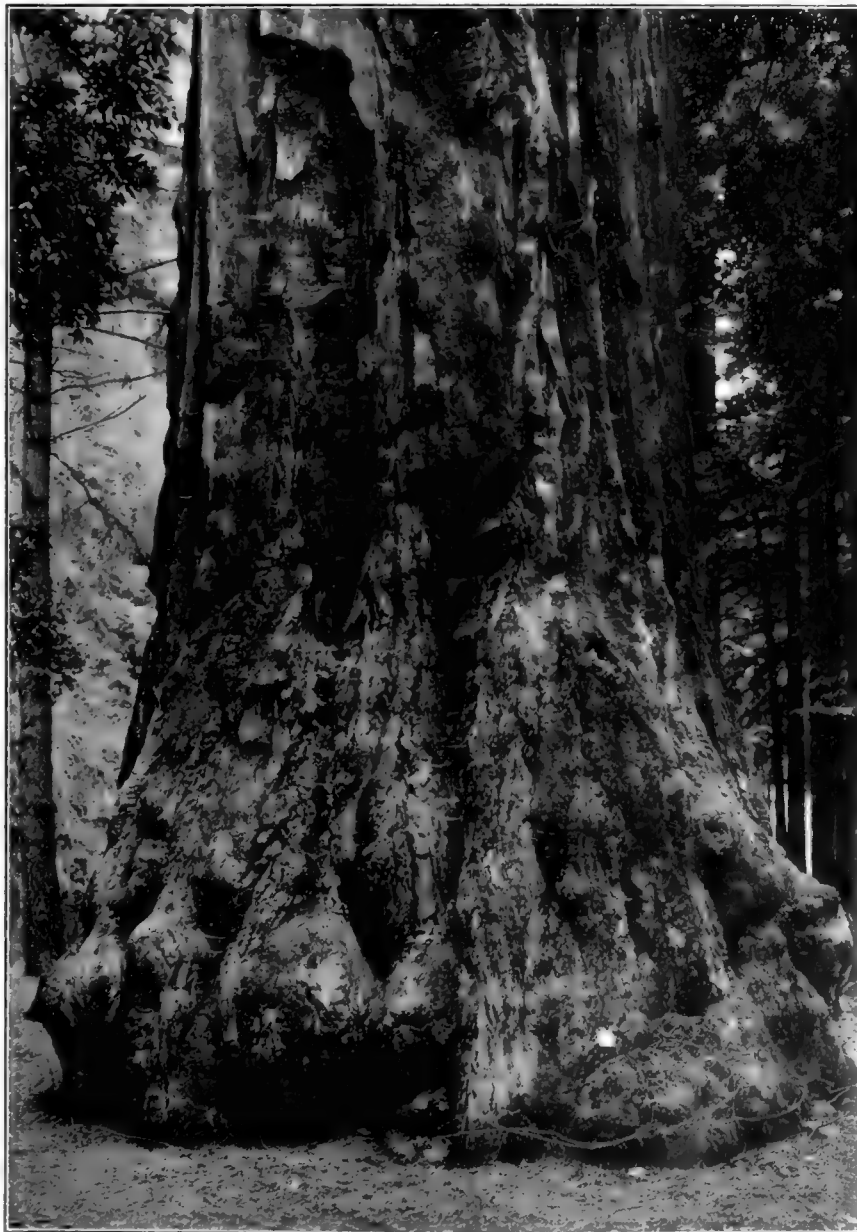
Redwood contains a large amount of tannin which probably explains its great resistance to rot and insects. The annual cut of redwood lumber in recent years has averaged about 250,000,000 feet board measure. Most of this output is used in house construction, and while by far the greater portion so far used was bought by California home builders, its use is steadily spreading over the entire country. Siding is one of its important uses, but the lumber is used for every part of the house, such as rafters, joists, studing, cornice and porch columns. Even floors of redwood are laid but the wood is considered by many to be too soft for this use. For years, largely on account of lack of transportation facilities, redwood was little known outside of the Pacific Coast territory, but with the recent completion of direct rail connection from red-

wood stands and the Panama Canal this lumber promises to soon become one of the important building woods.

The imperviousness of redwood to decay has long been known, and therefore its use by the home builder for foundations is not only natural but advantageous. Homes in Humboldt and Mendocino counties, California, were built on redwood foundations as long as fifty years ago, and the original sills are at the present day as sound as when first laid down. The weather resisting qualities of redwood, even when unpainted, are proverbial, and make it preeminent for exterior use. Barns erected in

Humboldt and Mendocino counties as early as 1855 were sided with unpainted redwood boards and covered with redwood shingles and shakes, none of which today show the slightest deterioration from exposure. The Russian Church erected at Fort Ross, California, in 1811, was built entirely of hewn redwood, and although the building was completely wrecked by the earthquake in 1906, the redwood itself is as sound today as when the trees from which it was hewn were felled.

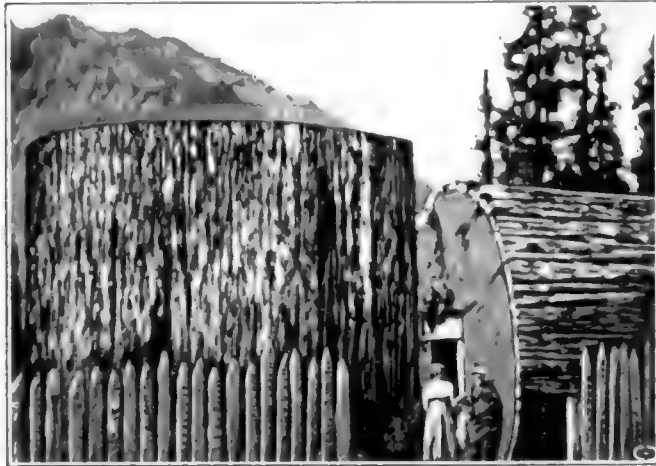
Redwood for interior finish gives the home builder a wide range of possibilities. It has, in the first place, all the merits of any other wood except the hardwoods, and in addition, the entire absence of pitch renders it especially adapted to take and hold paint or enamel. However, the beauty of



THE BASE OF A BIG ONE

From two to three thousand years ago this majestic growth was a thin and tender redwood sprout seeking its way skyward in a grove of patriarchal redwoods as large, and doubtless larger, than it is now.

the natural grain is so great that it is now common practice to finish the wood in its natural state. The decorative effects of the natural wood are richly varied; the shades of color which may be selected range from deep



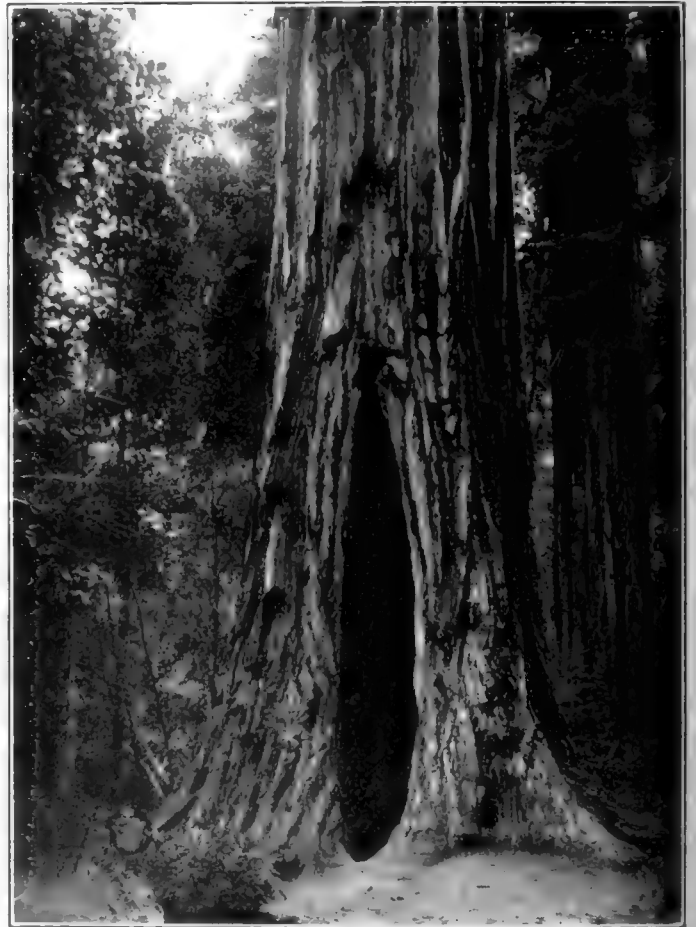
A HOUSE IN A REDWOOD LOG

This house is hollowed from a single redwood log at Eureka, California. It takes hundreds of years to "erect" this type of residence. The house has two rooms, each 10 feet square with ceilings 14 feet high.

mahogany to light cherry. Redwood produces excellent imitations of rosewood and mahogany. It carves beautifully and is much used for this purpose. An increasing amount of furniture is made from redwood, either from the plain wood or from wood with curly or wavy grain. Stumps and burls supply beautifully figured wood and the furniture made from it commands prices equal to Circassian walnut or English oak. It is also employed

in making novelties such as napkin rings, pin trays, match safes and can crooks.

The special feature of redwood that appeals to the wood-worker, in addition to the ease with which it is worked, is that absolutely clear and uniform boards of great width (boards 10 feet wide have been sawed) may be obtained in practically any desired length for panels, doors, tables, counter tops and the like. When it is considered that the redwood is highly fire resistant and neither warps, shrinks nor swells to an appreciable extent, it is easy to explain the popularity of this unique wood. The fire resisting qualities of redwood are well attested. No forest fire, no matter how severe has ever destroyed a redwood forest or killed a sound mature red-



STILL STALWART AND STRONG

Although the base of this redwood is eaten out by fire and rot until it is hollow the tree is so sturdy that it will likely remain standing for scores of years.

wood tree. In the Great San Francisco fire of 1906 this characteristic was put to a most severe test, as houses enclosed with redwood siding and covered with redwood shingles were saved. Although redwood will burn, it burns more slowly than any other wood, and when saturated with water, scarcely at all.

Railroads use redwood for ties and many other purposes. The ties resist decay, but are deeply cut by the rails, under heavy traffic, unless protected by tie plates, and the wood holds spikes poorly. Redwood is also used in culverts, trestles and bridges. The roofs, sides and interiors of cars are sometimes made of redwood because



A GANG OF REDWOOD LUMBERMEN

Looked at the foot of a tree which they are ready to cut down. This tree is typical of the best of the redwoods in the northern California forest.

it holds paint well, and shrinks and swells but little where the cars are exposed to rapidly varying extremes of heat and moisture. Redwood lumber used in freight cars has given 20 years service—an excellent record.

On the Pacific Coast, tanks and vats are commonly constructed of redwood. The largest and best wooden water pipes are made of redwood, as are also aqueducts and flumes built to supply cities and irrigated lands with water. Eave troughs and gutters of redwood are used not only in houses on the Pacific Coast but in distant regions.

Redwood shingles are one of this tree's best known products. In some years seven hundred million redwood shingles are produced. Redwood "shakes" are still on

vehicles. Redwood bark is of value also, being made into souvenirs that find a ready sale; because of its lightness it serves for fishing floats, cork carpet substitutes, insulation, and many other purposes. The lum-



A SUPERB REDWOOD ROOM

The entire interior of this room is executed in California redwood. Note the carvings and the great breadth of the panels.

ber is also used extensively for grape vine stakes and fence posts. Some of it is used for shingles, shakes, construction lumber, furniture and other uses described for redwood.

The enormous size of the Bigtree and the redwood is responsible for great waste in lumbering, in spite of the care taken in felling the trees. It is customary to clear a space so that the tree can strike the ground with the least possible breakage. Usually the choppers can cause the trunk to fall exactly where it is desired; a slight deviation from its expected course may waste thousands of feet of lumber or result in the splintering of an entire trunk, so tremendous is the force with which these giants fall.



THE REDWOOD EFFECT HERE IS MOST RESTFUL

This is an unrelieved redwood interior in the home of Otis Johnson at Fort Bragg, California, in the heart of the redwood district.

the market; these are boards used like clapboards for covering the sides and roofs of barns, sheds and other buildings, and are manufactured by splitting them from straight-gained, perfect logs. So easily does redwood split that boards 2 inches thick and a foot wide may be rived from a log 10 or 12 feet long. Such boards may have a surface so smooth that they may easily be mistaken for sawed lumber.

Redwood has many miscellaneous uses. It has served fairly well as a paving block for city streets. It is valuable for pattern making and for cigar and tobacco boxes, meeting all requirements for the latter purpose. It is used to a limited extent for fruit boxes, sign boards, musical instruments, coffins, and in the manufacture of



A REDWOOD INTERIOR

This is the dining room at "Three Rivers Farm," Dover, N. H., the country estate of E. W. Rollins. Note the great width of the redwood boards in the ceiling.

To facilitate handling the logs, the bark is removed from them and the debris is usually cleared away by burning. These fires frequently damage the logs and may also injure or kill standing trees. If the logs are very large, they must be split with dynamite before they can be transported to the saw mill and some of the best wood is shattered by the explosion. Other waste occurs in the woods through leaving crooked logs and wind shaken or otherwise defective trees when part of them might be used. Shake making is an especially wasteful



A REDWOOD LOG

This is an average specimen, and hundreds like it may be seen at redwood logging camps in the northwestern section of California. This log is stripped of bark and it shows the preponderance of heart wood over sapwood.

process. However, as the price of lumber increases, a premium is placed on the more conservative handling of logging operations, with benefit both to the lumberman and the public. Lath, shingles, ties and similar minor products are now being manufactured from much of the material that was formerly left in the woods.

AMERICAN FORESTRY is indebted to the California Redwood Association, Col. A. A. Taylor, secretary of California Redwood Park Commission, and others for photographs accompanying this article.

OPERATIONS ON PENNSYLVANIA FORESTS

FROM reports submitted by its foresters the Pennsylvania Department of Forestry has made up to date a summary of cost and extent of major operations conducted on the State Forests.

The total area owned by the Commonwealth for forestry purposes is now a trifle over a million acres, acquired by purchase at an average cost of about \$2.27 per acre. Since the first land was bought, eighteen years ago, about \$2.25 per acre has been spent by the Department for all work connected with the State Forests, exclusive of purchase price.

Four large nurseries and twenty small ones have been established, in which are now growing almost 20,000,000 seedlings. Woods roads existing when the forests were established have been opened by the Department to the extent of 1,250 miles; 316 miles of new roads have been built at an average cost of about \$200 per mile; 525 miles of trails have been opened; 1,050 miles of boundary

lines have been brushed out to trail width; 725 miles of fire lanes have been brushed and burned, ranging in width from 4 feet to 60 feet; the total number of miles of roads, trails, fire lanes, and boundary lines opened is almost 4,000. In addition to this, 1,600 miles of boundary line are surveyed but not yet opened.

One hundred wood, steel, and tree observation towers have been built at a total cost of a trifle over \$3,000. Over 250 miles of telephone line have been built to connect the towers with foresters' headquarters. Houses, barns, and other buildings to the number of 122 have been built for the Department's field force; 1,168 springs have been cleaned, walled, and made accessible for camp sites; over 800 fires have been extinguished on State land only; 825,000 fish have been planted in streams which originate in State Forests; 180 miles of compartment lines are opened; chestnut blight has been removed from over 40,000 acres. In this connection it is interesting to note that 28 foresters report the blight spreading rapidly in their districts; 8 report it apparently stationary; 14 report no blight, or do not report; and but one reports it receding. The infections reported are found from the New York line to the Maryland line, and from the New Jersey line to the extreme northwestern part of Clearfield County. This effectively nails the statement that the blight is dying out in the State.

Exact figures are not yet available for the reforestation done by the Department. However, at a low estimate, at least 16,000,000 seedlings have been planted to date on about 8,000 acres of the State Forests. It is estimated that about 350,000 acres of their present area must be artificially reforested, and special effort is being made to enlarge this branch of the work. This year about 7,000,000 seedlings will be available for spring planting, and at the present rate of increase in nursery production, it will be only a few years until from 10,000,000 to 20,000,000 will be planted every spring. Counting 2,000 trees to the acre, this will mean the annual reforestation of from 5,000 to 10,000 acres, and the completion of the work in about thirty-five years.

The total income from the forests to date is \$125,000. Most of the revenue is derived from the sale of fire-scarred or otherwise damaged timber, and from the sale of stone. The whole sum has been paid into the State School Fund, in accordance with a recent act of the Legislature.

MAINE BALSAM FIR DYING

IT IS reported that the balsam fir in Maine is gradually dying out from some unknown disease. This tree is very susceptible to attacks of fungi and begins to suffer from heart rot at an early age. Much of it is diseased in this country, and its gradual elimination and replacement by spruce would be perhaps a good thing. Of course, from the standpoint of the camper this would be a hardship, as a bed of spruce boughs is neither so fragrant nor so comfortable as one of balsam. It is a curious fact that bears like to sharpen their claws on balsam trees, and it is very common to see the marks of their claws, and in this way many trees are injured.

Shot, Shell and Soldiers Devastate Forests

BY PERCIVAL SHELDON RIDSDALE

WHAT has the war done to the forests of Europe? What will be the condition of these forests when the war is over? To what extent have they been cut down for military purposes? How badly have they been damaged by shot and shell? All these and similar questions have been in the minds of foresters and lovers of forests since the great war started, but comparatively little information has come from the fighting front in either the east or west. Efforts of the American Forestry Association to secure statements from Germany on the condition of the forests in territory captured by the Germans, and on German soil, have so far failed. The French government was asked for permission to have a representative of the association enrolled in the ambulance corps with permission to make inquiries regarding forest land in northern France and to take photographs of forests which have been damaged or destroyed, but this was refused with apologies as a military necessity.

Occasionally statements have come from Canadian soldiers who are members of the Association, from French, English or Belgian officers who are interested

in forestry, and from newspaper and magazine correspondents on different fronts and on the whole it has been possible to thus obtain a fairly satisfactory general idea of what effect the war has on the forests in the area of the fighting.

BELGIUM DENUDED

BELGIUM, the major portion of which is in possession of the Germans, had some forested land, which was, as it might well be termed, more of a scenic than a commercial nature. Advises indicate that these forests have practically been destroyed. Much of the timber was used by the Germans for military purposes; in the construction of trenches, in road building, in the erection of shelters, barracks, etc.; considerable was used for fire wood, and it has been stated, with what accuracy it is impossible to say, that timber not used in this way or needed in the military zone has been shipped to Germany for home consumption. Most probably this is so. Before the war Germany imported large quantities of timber from Russia and in the last few years preceding the war these imports greatly increased. English



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THE VALLEY OF DEATH NEAR VERDUN

View of a small wooded valley on the heights of the Meuse River near Verdun. This wood was subjected by the Germans to a terrific bombardment, which killed every tree in it. Note the numerous small pools of water, each indicating where a shell struck. Many of the trees were blown into splinters.

writers, calling attention to this fact, insinuate that the Germans knew the war was coming and imported as much timber as possible in order to conserve her own supplies, and to be able to provide for the expected large demand by the military in case of war.

As regards Belgium then, it would not be at all surprising to learn, when the war is over, that there remains on Belgian soil no timber of commercial value; that her scenic forests have been wiped out, and that thousands of her roadside and street trees have been used for fuel and for other purposes by the Germans.

THE DAMAGE IN FRANCE

IN northern France, on both sides of the fighting front, great damage has been done to the forests not only by the tremendous bombardments which have marked the fighting there, and by the hail of bullets from small arms which have swept forested spaces, but by the trench builders, the road engineers, and others who needed timber for construction work. Thousands of new roads or passageways have been built for the rapid transportation of guns, munitions, supplies, and men, to thousands of points along both fronts. Many of the roads or passageways are of the type known

as corduroy roads, the base being made of tree trunks, overlaid with branches and these branches overlaid with earth. These roads alone have necessitated the cutting of thousands upon thousands of trees. In the lining of trenches and the building of shelters there has been unceasing demand for more and more timber, and when it has been on hand in the shape of single trees, groups of trees, woodlands or forests it is fair to assume that it has been freely used.

In addition the destruction by shot and shell has been tremendous. Trees that have not been blown down or cut through or shattered have been so badly damaged

that they will die; others, pitted with bullet holes or wounded by other shot, are now open to disease or insect attack, while there are long stretches of forested lands the condition of which is so graphically illustrated by some of the photographs used with this article. A war story from France recently contained the following statement:

"On a trip behind the French front one is inevitably impressed by the immense amount of work not strictly of a military nature which the army does. First there have had to be built hundreds of miles of new standard and narrow gauge railroad to feed the trench line. Then comes the question of roads. All old highways are kept in perfect repair and thousands of miles of new road are constructed. In the region called the Champagne Pouilleuse the road question was a particularly difficult one. Loads of stones are swallowed up without much effect. So logs are laid side by side and corduroy roads built. There are hundreds of miles of these corduroy roads and over them pass heavy artillery, motor trucks filled with shells, and other large vehicles.

"Immense quantities of wood are used by the army. Soldiers' cantonments, ambulances, water installations and the corduroy

roads all call interminably for wood. For this purpose temporary saw-mills are established just in the rear of the fighting zone. All this work is done with a remarkable elimination of waste."

What has happened in the forest of Argonne where there has been so much desperate fighting is indicated in a newspaper dispatch which says:

"When the history of the present European war is written, the forest of Argonne will be recorded as the place where more blood was shed than in any other spot on the wide fields of conflict. The French made a stand there on the first German drive towards Paris,



Photograph by Underwood & Underwood.

THE TOOTH-PICK FOREST

This is the name given by the Germans to this devastated woodland where the artillery and small-arm fire has stripped the trees left standing of their branches. This forest is in Flanders and the ground has been fought over several times. The picture is a striking indication of the quantity of lead and iron which must have swept through the trees to damage them as they are damaged.

and, later, when the Germans were forced back, it was the scene of weeks and months of desperate struggle.

"Not a bird is left in the forest and practically every tree, which remains standing, bears the mark of battle. It was swept by artillery fire time after time, and was the scene of desperate hand-to-hand fighting.

"But it was not the first time, for in the campaign preceding the battle of Sedan, in the Franco-German war of 1870, it was the scene of many sanguinary struggles.

"The forest covers a number of wooded heights, 800 or 900 feet high, in the northeastern part of France in French Lorraine and Champagne. It is about thirty miles long, and from one to eight miles wide. It is bounded by the sources of the Aisne, runs along that river to the Meuse and northward to Chene-Populeux, separating a stretch of fertile plains from the barren steppes between Vitry and Cezanne."

Much of the most recent hard fighting in northern France has been in wooded and forested land and the damage done in actual fighting and the cutting of trees necessitated by military operations daily continues.

Perhaps it is not taking too pessimistic a view of forest conditions in that section to say that it will be a hundred years before the forests of northern France are restored to anything like the conditions they were before the war, and that restoration largely depends upon the action of the government in relation to them when the war is over.

A FRENCH WRITER'S VIEW

QUITE the best description of the situation in France is from the pen of Louis Marin, député of Meurthe-et-Moselle, who in a recent article says: "What have been, during the war, the causes of our forests' destruction? The building of trenches on two adverse fronts; the ravaging effects of projectiles

hurled by guns of all calibers, which, in a hailstorm of iron, mow down everything before them, breaking the trees and leaving, instead of a thickly-wooded area, a mere strip of land covered with dismantled trunks, and dead snags; the construction by the engineering corps of works of defense; the consumption of firewood; the erection of log shelters, in short, of many works necessitating an extensive felling of trees, and, finally, the hewing down of an enormous number of trees of all sizes which obstructed the range of the artillery.

"Everywhere, forests have been of precious assistance to our soldiers; it is while concealed in them that we have lost the least men. From the offensive point of view, in this war of trenches, which has been waged for long months, it is where our positions were protected by woods that we have gained more ground. From the defensive point of view, they have fully favored our troops. The woods of Argonne, however reduced from Dehouriez, have set up in the way of the invaders the barriers of 1792, and thus the investment of Verdun was averted. The woods of Grand-Couronné have contributed to the halting of the sad retreat of Morhange and to the resistance in the defense of Nancy. These services are recorded in the

orders of the day; the country thus learns the names of the woods of La Grenie, Bolante, La Cheminee-Saint-Hubert, Le Petre, of the forests of Apremont Grand-Couronne, etc.; our brave boys describe them in their letters."

M. Marin says of the future of the forests: "The war has brought out the strict and urgent necessity of rebuilding the forests. It is impossible to neglect our mutilated forests; it would be a crime to not take up now steps in order to ensure, in a comparatively near future, their reconstruction."

M. Marin then enumerates the wooded regions that



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SCENE ON THE VERDUN FRONT

This once well forested hillside presents now a scene of utter desolation. Terrific shell fire swept these hillsides for days and destroyed every tree. The holes made in the ground by exploding shells may be seen and the bullet holes in the trunks of the trees left standing make some of them resemble a sieve.



Photograph by Underwood & Underwood.

NOVEL EFFECT OF SHELL FIRE

A German shell struck this tree adjacent to a French trench and it fell in such a manner as to improve the fortification. An incident is related of how between Barcy and Varredes the top of a tree was blown off by a shell. In falling the severed part of the tree was caught on a projecting branch and hung balanced in a horizontal position at right angles to the trunk, thus forming a cross. Nearby are the graves of thirty French soldiers killed in September, 1914.

have been subjected to the military operations of this conflict. He finds that, in general, the forests at the front have been laid waste; the soil as well as the forests themselves has been destroyed. At those places where the struggle has been most acute, the land will have to be completely razed. With regard to the trees injured by bullets, it has been found that their wounds, unlike those of man, do not heal. After a few years the trees die, and can then only be used as firewood; as they are liable to rot, it is better to fell them soon so as to obtain the best possible use of them.

The writer then discusses a bill he has prepared with a view to overcome the disaster caused by this war, and in which he suggests a thorough reconstruction of the ruined forests of his country. The bill deals with "the gravity of the damages caused to our woods and forests; the calculation and the estimates

of these damages, the means and methods to be adopted in the reconstruction of the said forests; the necessity of special legislation in connection with these improvements; the difficulties of all kinds to be confronted in the application of the present law; the solution of the problem in the purchase by the state of all forests affected."

In explaining his bill, he admits that it will be difficult to ascertain the whole extent of the damages. A committee of experts would be entrusted with this task. M. de la Roussiere, general secretary to the Forest Committee, is quoted as saying: "About 515,000 hectares of our forests are damaged. It is not completely devastated, but in estimating the loss at two-thirds we should not be far from the truth. It will take at least a century before our forests are restored to their original conditions."

Referring once more to the



Photograph by Underwood & Underwood.

ONE LARGE SHELL DID THIS

This tree, within the French lines near Verdun, was destroyed by one large German shell. The shell struck at the base of the tree and the splintered trunk is evidence of the tremendous shattering power of the explosive with which the missile was loaded.

damages to which the war has subjected the forests of France, M. Marin does not lose sight of the fact that the devastation is still going on as violently as ever, and that it is impossible to foresee all the efforts which will be required of the nation. But France must be interested now in this great problem in order to be ready to proceed, when the time comes, with the least delay possible to the reconstruction of her forestial resources. "All delay in the rebuilding of this heritage," he says, "would spell losses impossible to estimate to thousands of people living on the forests."

Of forests in parts of France where there has been no fighting not much is known, but the inference is that owing to the unceasing military demands for timber the annual cutting is very much greater than it was in times of peace, and this means, doubtless, that practically all timber that has matured has been cut and used, for France, like England, was in times of peace a large importer of timber, and like England, her supply from Russia, whence most of it came, has been cut off since the war started.

RUSSIA'S SLIGHT LOSSES

THERE is no occasion for concern regarding Russian forests, for the losses due to warfare are infinitesimal when compared with her tremendous forest resources. Then, too, so Stanley Washburn told readers of *AMERICAN FORESTRY* in an article last year, even in the forests where there has been severe fighting the damage done the trees is hardly worthy of note, because the forests are so dense and so extensive. Russia with her wonderful forests will have a glorious opportunity for an immense lumber business when the war is over, and if she can take advantage of it she will become the main source of timber supply for all the warring countries of Europe.

Practically no advices have come from Italy regarding any destruction of forests due to the war, nor has much been reported or written about Austria's situation in this respect.

NO NEWS FROM GERMANY

IT IS certain that Germany has done a great deal of cutting in captured enemy territory, chiefly in Poland and western Russia, and that she has conserved her own forest resources in the thoroughly efficient and scientific manner in which she has for so long managed her forests, but news of what she has or has not done would

be doubtless of some military value to her enemies, and so in America nothing of importance has been heard regarding her forests. Recently three small news stories have appeared. One says: "All owners of forest or other land in Germany that is not being used for agricultural purposes are to be compelled to open up their property for the purpose of affording pasture to cattle and swine, according to an order issued by the Federal Council on April 13 and reported in the *Frankfurter Zeitung*. The authorities are also empowered to oblige these land-



Photograph by International Film Service.

THESE TREES WERE IN THE LINE OF FIRE

It frequently happens that artillerymen on each side cut down trees which are in their line of fire. Here the stream of battle swept through a wood and the trees were cut down so the French guns would have a clear line of fire. Note the dead German soldier lying partially covered with earth evidently thrown about by the explosion of the shell which killed him.

owners to erect the pens and shelters necessary to care for their animal guests, but they will be recompensed for this work. The pasturage is to be free to the persons or societies needing it. Furthermore, the people are to be permitted to clean up such forest and similar unused lands in search of litter for bedding for their livestock."

Another story tells of forest planting. It came by wireless from Berlin to Sayville, L. I., and said: "Four hundred acres of land in Grunewald Park, a favorite resort of the people of Berlin, lying southwest of the city, has been converted into a forest. A report issued today by the Berlin Forestry Department shows that 1,600,000 trees have been planted."

A third article declares that: "Paper beds, with paper sheets and paper pillow cases, are now being used in Germany by the poor. The material for mattresses and bedding has become so dear that it is impossible for any but the comparatively rich to afford them. The mattresses are now made of strong sheets of paper pasted together and filled with dried leaves of beech and oak trees. These

leaf mattresses are said to be as comfortable to lie on as any filled with feathers. The paper used is toughened by a special process, which prevents tearing easily. The leaves for filling the mattresses and pillow cases have been collected in the great German forests by bands of children at a practically negligible cost."



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STRUCK BY A GERMAN SHELL

This shows the damage done by one shot. The tree is practically killed, the top portion being so weakened that it is likely to be broken off in the first wind storm.

ENGLAND'S FORESTS GOING

THE effect of the war on the forests of the British Isles will likely be the utter destruction of most of them. The war has created imperative need of lumber, and at the same time has cut off England's main source of supply as well as made prices for what can be imported almost prohibitive. In time of peace England's timber imports were valued at about \$215,000,000 a year

and this figure gives some idea of the amount she has needed since the war started. So great is her need, in fact, that already many of her home forests have been cut down, and as everything must be sacrificed to the war, it is altogether probable that trees on many estates and on many private parks and woodland have been turned into lumber for barracks, etc.

An interesting feature of the situation is the organization of a Canadian forestry battalion, the 224th Overseas Battalion, consisting of expert Canadian lumbermen and woodsmen, to the number of 1,500, who have been sent to England and been used in lumbering operations in England, Ireland, Scotland and Wales. This unique battalion is commanded by Lieut. Col. Alexander McDougall of Ottawa, Canada, a well-known railway contractor. The men came from British Columbia, Alberta, Saskatchewan, Quebec, New Brunswick and Ottawa. The battalion was reviewed at Ottawa before its departure for England recently and the commanding officer, in speaking of it, said: "The men of the battalion carried, during the parade, peavies, camp-dogs, cross-cut saws, etc. The parade was not intended to show what implements they should carry, but merely for inspection by His Royal Highness the Governor General. Our equipment altogether will be that used in the lumber industry in Canada."

The battalion is already at work in England's forests, and while the number of trees daily cut down and sent to sawmills is not stated, the progress that 1,500 expert lumbermen can make in felling trees can readily be imagined.

An Ottawa despatch under date of May 28, states that the War Office has called for another Canadian Forestry Battalion of 1,500 men. The 224th Battalion, under command of Lieut.-Col. Alex. McDougall, has done such excellent work in England and Scotland in aiding the naval and shipbuilding industries that a second battalion of this nature has been authorized at the request of the British authorities and recruiting will begin immediately in the lumbering districts. Lieut.-Col. J. B. White, of Montreal, formerly of the Riordon Pulp and Paper Company, who is now with the 224th Overseas Battalion, has been recalled to organize and command the new regiment. A third Battalion is also to be raised, with Lieut.-Col. W. R. Smyth, M.P.P. for Algoma, in command. This battalion will be raised in Ontario.

WHAT OF THE FUTURE?

OF THE situation in England and the need for future action, Edward Percy Stebbings, F.L.S., F.R.G.S., a well-known expert on forestry, writes: "We are now engaged in cutting down, in sacrificing, such woods as we have in this country. And we have, say, some 5,000,000 to 9,000,000 acres of land in these islands which expert opinion is unanimous would grow timber, and a considerable proportion of which would carry fine crops of commercially profitable timber trees.

"Heavy fellings are being made in our own woods under the auspices of the Home Timber Committee in

order to supplement our imports. Lord Selborne's well-timed action in appointing the Home Timber Committee was wise. There are two points in connection with these home timber fellings, however, which might, without undue hardship, be insisted upon, (a) all woods purchased and felled by government at the present high rates should be at once replanted by the owner as a condition of contract; (b) the Home Timber Committee should keep a careful record of the amounts of material cut from the areas they purchase, its nature, locality in which grown, etc., for this will prove a valuable record in future planting operations.

"My proposition is that the Allies should place themselves in a position to control the European timber market at the end of the war—to exercise, in fact, a state control over prices for a time, as the only effective means to cope with the enormous demand which will exist, and to prevent the formation of timber "rings," either by the Central Powers or others. It is no plea that such a thing has never been done before. The end of the war will find us, the war itself is finding us, doing a good deal we never thought to have to do.

"First, then, we want to place our finger on accessible supplies in large quantities and owned by the Allies; and, secondly, to come to an agreement by which these supplies can be made available at the earliest possible moment with the object of bringing down the present preposterous rates.

"If we examine the forestry resources of the Allies, the one great fact which immediately becomes apparent is the gigantic area of the forests in Russia, the Land of Forests, as it has been termed.

"My suggestion is that Russia should be asked by the Allies—by the British Government, if necessary, since we are very deeply concerned in this matter, as, unlike our other Allies, we have no forest resources of our own at our backs—to institute fellings on a large scale in those of her forests which are adjacent to the most suitable ports. Every saw-mill in these regions should be set to work converting timber at high pressure and stacking it in suitable depots for transport to the areas required at the earliest possible moment.

"If afforestation is taken up in this country on the scale now so urgently needed, we shall have to wait about thirty-five to forty-five years to obtain pit props from the woods, and longer for large timber.

"I would suggest that to tide over this long period we should lease for a period of years a large area, or several areas, of the Russian forests and work them ourselves, in order to ensure that this country obtains a proportion of what she requires in timber, etc., independent of extraneous imports and at a reasonable price.

"There are 3,000,000 acres of so-called afforested land—of woodlands, in Great Britain, and we have, say, 9,000,000 acres of afforestable land; put it at 7,000,000, or even 5,000,000. It will do to go on with. It has been stated by many who know what they are talking about, that this land, or much of it, will bring in more

under trees than under any other form of cultivation; or, to put it in another way, that this land will prove a greater national asset under woods than managed in any other way. Why not, then, set to work and get it planted up? If for no other reason than the one of national economy, the matter must be regarded as one of urgency.



Photo by Underwood & Underwood.

WHAT TWO SHELLS DID

This tree, just above the post of an officer in command of a line of trenches on the French fighting line, was struck by two shells. The first bit a large piece out of it and the second shattered and overthrew it.

We can no longer afford to leave any source of national wealth unexploited. We must all agree that it has become a duty—a national duty—to see that every acre of land in this country is made to bring in the best return possible in the interests of the community as a whole. Well, there exists a considerable acreage of land which experts are agreed is not bringing in anything like an adequate return. This land can be made to grow produce which is in great demand in the country, and which in the absence of homegrown supplies, necessitates large imports that have to be paid for, and are going to be more expensive in the future. The aspect of the forestry problem has entirely changed from its pre-war position. The prices of timber are not likely to fall to their former level. So long as prices were low there was a good deal to be said for those who were against afforestation in

this country. They put forward arguments which had certain elements of soundness in them, the contention that forestry would not return even the 2½ to 3 per cent claimed for it. The Great War has swept away such doubts and arguments. Prices have gone up, and the nation is now assured of successful financial results from afforestation work. On all counts the planting of this land will be of immense advantage to us. It will save imports, employ labor, and help home industries. In the last connection it will do more than help. It will result in establishing new ones. For the maintenance of a considerable area of forest in a country leads to the estab-

lishment of subsidiary industries such as paper-pulp mills, saw-mills, bobbin mills, furniture manufactories, and so on. And these afford employment to a considerable head of population.

THE LESSON

IN all of this there is a lesson which the people of this country should not be slow in learning. What that lesson is is forcefully outlined in the article on page 341 of this issue, and in the statement on this page by President Charles Lathrop Pack, of the American Forestry Association.

[A warning that the forests and forest products of this country will play a large part in our economic preparedness as a result of the Great War is sounded by Mr. Pack in the following statement based upon a close study of the situation and an intimate knowledge of forest conditions in Europe.—The Editor.]

Preparedness and Forest Products

BY CHARLES LATHROP PACK

President American Forestry Association

THE enormous amount of timber that has been cut in France in particular, and also in Russia and in England, has produced an economic condition in relation to lumber which is unprecedented. While we do not look upon England as a forest country, there is in England and Scotland a considerable amount of timber and some fine old forests of hardwood. These have been slaughtered since the opening of the war because of the great lack of timber in England. The British need is evident from a statement by Walter Runciman in the House of Commons a few days ago that 1,500 Canadian lumbermen had arrived in England to cut timber for mere props and other necessities to avoid, as far as possible, importations from other countries. Much cutting has been done in France, while in captured Belgium the Germans have cut a large proportion of the forest land and used the timber in military operations or shipped it to Germany.

"While lumber has been imported into the belligerent countries to some extent from the United States and elsewhere, such importations have by no means compensated for the large amount of lumber that has usually come under normal conditions from Germany and Russia. This has necessitated the slaughtering of timber. Large amounts have been used for the trenches and larger amounts have been

used for temporary buildings for the shelter of armies, and other important amounts for economic purposes of manufacture, while there has been a tremendous destruction of standing timber by artillery fire. All this means that the potential value of the forests of France, Belgium and England in particular has been greatly reduced.

"The great depletion of these forests of Europe increases the economic world importance of American forests. No economic preparedness in the United States will be complete without due regard to the value of forestry. We must mobilize the industrial resources of this country if we are to go forward as a nation in proportion to our opportunities. After the world war is over the industrial competition will be far-reaching and for us there will be a victory or defeat just in proportion to our preparedness. If we are unworthy we shall fail. The forests and forest products will play a large part. A country which continually abuses its timber resources as we do cannot expect to continue with economic success. This is our opportunity and if we properly read the signs of the times we will fully realize the great value of our forest inheritance and prepare to use it with economic foresight and not abuse it as has been our wont."

Our Forests in Time of War¹

“ALTHOUGH the bulk of the forests contributes largely to the peaceful development of our country, the part which forests play in the time of war cannot be disregarded,” so said the Forestry Committee at the meeting of the Conservation Congress in Washington early in May. The committee added: “Wood enters in large quantities in the manufacture of powders, particularly of the ordinary black powder. In spite of the advent of smokeless powders, enormous quantities of black powder are still used in the making of shrapnel and in the manufacture of most armor-piercing shells. Rosin, another product of the forest, is also employed in the manufacture of shrapnel in filling the spaces between the bullets. There are also indications that wood is being used in the production of smokeless powder. The famous English chemist, Sir William Ramsey, is of the opinion that the Germans are now using wood to obtain nitro-cellulose in the manufacture of the propellant explosive. If this is true, then wood cellulose has taken the place of guncotton in the manufacture of smokeless powder. Acetone, which is used in the manufacture of propellant explosives for all calibers of guns, is a product of the destructive distillation of hardwoods. Since from 75 to 100 tons of wood are required to produce one ton of acetone, enormous quantities may be needed for this purpose alone. In addition to acetone, alcohol is used to a large extent in the manufacture of explosives and this again may be obtained from wood cellulose. Wood is also used in surgery; it is made into a soft, surgical absorbent cotton, now in use in Germany; it is made into tough crepe paper and used for splints, and into fiber boards for splints.

“Although the forest area of the United States is estimated at 550 million acres, a large portion of it has been cut over, and the present area of standing timber available for the manufacture of lumber cannot be over 300 million acres. Nearly half of the original stand is already gone. One-third has been destroyed by forest fires, one-third cut and used, and one-third has been wasted. About one-fifth of the standing timber is publicly owned and four-fifths in private hands. The most important of the public timber lands are in the National Forests, aggregating 165 million acres, in the Indian Reservations, aggregating 7 million acres, and in forest reserves owned by various states, aggregating upwards of 3½ million acres. Most of the National timber lands are largely in mountainous and in the less accessible regions.

“The annual growth of wood in the forests, most of which is a matter of chance, while it cannot be definitely determined, is without question much less than that of the amount used (100 billion board feet) and

the country is drawing upon its forest capital to the extent probably of many billions of feet each year.

“The moving of the lumber industry from the place which it has exhausted to another place where there is a plentiful supply has been characteristic not only of the lumber industry itself, but of the industries depending upon timber. It is evident that such a system of development of our forest resources, while it may possibly have helped to build up quickly all sections of the country, has resulted in most cases in weakening the local communities where the forest has originally been found and increased the cost of lumber to the consumer. This method of cutting has another drawback which may become a source of great weakness in the time of national stress. If, as our military friends point out, in case of invasion by a foreign nation, our Pacific coast should become cut off from the rest of our country, the bulk of our timber resources would become inaccessible to us unless the southern and other timber regions of the country are built up and placed on a permanent basis.

“Similarly, should the Southeast become the field of invasion, our naval stores industry, so essential both in the times of peace and of war, would be lost to us, and we would have to depend on other portions of the country to secure our naval stores. This is just what happened during the Civil War when the North was forced to tap the western yellow pine to secure the needed supply of naval stores.

TWO SOURCES OF WEAKNESS

“THE lack of permanency in our lumber industry and the consequent failure to develop the timber resources of various sections systematically and on a permanent basis where agricultural development is not replacing the forest, is also responsible largely for creating conditions unfavorable for the employment of labor. Because of the transient character of the industry nothing could be built but temporary camps or shack towns. Few laborers who choose the logging industry can ever expect to live in a permanent house. Family life, therefore, is impossible to the majority of employes in the industry.

“Here again is a source of national weakness. National interests demand care of the laborer. The human product of the timber land is, as the history of our Revolutionary and Civil Wars teaches us, one of the most important assets in our national life. During our Civil War the Southern Confederacy was ‘practically cut in two by the wedge of loyal mountaineers from the Appalachian chain,’ and they startled the nation on the scene of this war by sending 180,000 of their riflemen into the Union Army. The mountain men, unassisted, saved

¹Extracts from the report of the Forestry Committee of the National Conservation Congress which met in Washington in May.

North and South Carolina and Georgia during the Revolutionary War and paved the way for the final surrender at Yorktown by their victory at Kings Mountain. It was the woodsmen of Tennessee that saved the day for Jackson at New Orleans in the war of 1812. It was the lumber camps of Pennsylvania that formed the first rifle regiment—the famous 'Bucktails.' It was the mountaineers of New Hampshire who prevented the escape of Burgoyne at Saratoga, and it was in response to Ethan Allen's emphatic demand that Ticonderoga surrendered to the 'Green Mountain Boys.'

"The transient character of our lumber industry when not followed by agriculture has produced another source of national weakness. As the timber has been cut in such regions the population has moved away and the congestion in and near the cities has been growing.

"The Pacific Coast and the Northwest, to which the center of lumber production is now being transferred, is the last field in this country where the timber supply is plentiful and will afford opportunities, at the present rate of cutting, for lumbering operations during the next 40 or 50 years. The bulk of the private timber holdings in this region is in the hands of a comparatively small number of companies. Since the carrying charges, such as taxes, fire protection and interest on the investment, are rapidly accumulating, while the lumber prices remain practically stationary, the holding of the properties, even for a period of 40 or 50 years during which they can be cut out, becomes a heavier burden every year to many of the stumpage owners. Within the last few years the country has been brought face to face with a most significant economic fact—that the development of the timber resources, so vital to the economic and social life of the nation, proves to be a rather unprofitable business when it is handled by private individuals. Instead of being a source of permanent revenue and stability to the nation, it is full of uncertainty, hazard, and financial loss. Such a situation from the standpoint of national efficiency cannot be considered other than a case of weakness which calls for careful consideration and adjustment.

REGULATING FLOW OF WATER

"**A**SIDE from these material disadvantages from which the country is suffering because of the present system of utilizing our timber resources there is another effect which is equally vital as the material resources themselves, and that is the effect which the indiscriminate cutting of the mountain forests has upon our rivers and streams. In America in its aboriginal state the largely continuous forest cover, especially on the mountain slopes, acted as a stream regulator. To make this regulation complete and attain still more equal distribution of river flow, artificial storage reservoirs were needed. The forest cover needed to be supplemented.

"What has happened, however, is that the forest cover, instead of being supplemented was, over a large portion

of the country, depleted and thus on many strategic watersheds our natural storage reservoirs have been rendered less effective and the efficiency of other still untouched watersheds menaced. In consequence, an overwhelming portion of our national physical power runs wild in floods and is thus used up in rendering further desolation. The sources of much of our national energy have been weakened—not by a thirty years' war—but by a thirty years and more of state and national neglect.

"The mountain forests of the West are still further indispensable in the irrigation of our arid land. They are an important factor in supplying water for the fifteen and one-half million acres of lands now irrigated in the United States, with their annual crop production of 277 million dollars, and they will be needed more and more if the irrigated area is to increase in the future. To forests, then, hardly less than to the water itself, is due the fact that Colorado, once thought to be practically worthless for agriculture, now grows crops that exceed its mineral production; that the once arid wastes of Arizona and New Mexico now vie in productivity with the humid regions of Indiana; and that the famous orange lands of Southern California are now one whit more useful than the dreary expanses of the Mojave Desert.

"A country depleted of her forests with a soil exposed to erosion or to the blowing by the wind, with alternate floods and drought, with rivers rendered unnavigable, with people losing the admirable traits which come from constant contact with nature; in a word, a nation which cannot husband its own wonderful resources and save them from destruction and devastation, is not an efficient nation and does not possess the essential elements of resistance which are needed during a great crisis.

WHAT NEEDS TO BE DONE

THE majority of the American people have now come to recognize these facts as fundamental, and a change is gradually coming over our land. There is a growing feeling that individual initiative alone is powerless to bring about the permanency and the proper development of our forest resources which are basic to our national efficiency and strength. As a result of this awakening, there have come now into existence the National Forests, which have been created from the forest lands on the public domain. These lands are located chiefly in the western mountain regions. The National Forests include also the south coast forests of Alaska and several forests in the Lake States, in Oklahoma, Arkansas, and Florida, and a small area in Porto Rico. Not only have National Forests been established out of the public domain, but under an Act of Congress in 1911 eight million dollars have been made available for acquiring by purchase forest lands at the headwaters of navigable rivers. Under this law there have already been acquired or contracted for nearly one and one-third million acres in the White Mountains of New Hampshire and in the southern Appala-

chian Mountains. There are today 155 National Forest units in addition to the new forests now being acquired by purchase. These public holdings include 162,773,280 acres of land. Excluding Alaska, the National Forests comprise about 30 per cent of the public land, the balance being chiefly grazing lands; there are still, however, several million acres of forest land that should be added to the National Forests. The National Forests of Alaska occupy about 7 per cent of the publicly owned land in the territory. In addition to National Forests, there are 14 National Parks, occupying 4,481,606 acres, areas of exceptional scenic features set aside and administered for the exclusive purpose of recreation.

"In addition to the Federal Government, several of the more progressive states have now acquired forest land and established state forests similar to the National Forests. New York has a state forest of a million and a half acres, Pennsylvania has an aggregate of more than one million acres. The aggregate area of state forests amounts to upwards of three and one-half million acres. The movement for building up state forests will grow and result in a very considerable increase of forest land owned and controlled by the public. In addition to acquiring land, many of the states are making effective progress in the direction of safeguarding the forests against fire, the first step in forest conservation. No less than 20 states have made some appropriation for fire protection work. Furthermore, private owners in many states, particularly in the Lake States and the Pacific Northwest, have organized for forest fire protection and have given the states an active and valuable cooperation. The annual loss by fire, which has been the scourge of our forests in the past, is thus being gradually reduced. There are still probably about 125 million acres of private timber lands which, because of their location either on critical watersheds or on soil which, if deprived of the forest cover, may become a menace to the public interests, should be protected and made a productive asset to the nation.

"The mountainous portions of all watersheds should be protected. About 70 per cent of the mountain land of the United States is, or should be, in forest—the remainder being largely grazing land. Forest operations and grazing on these portions intimately affect stream-flow and so *all* mountain land, whether forest, grassland or other, should be under some form of public regulation.

"There are about 260 million acres of mountain land in the United States, or 14 per cent of the total land area. Twenty million acres of this are on the Atlantic Coast drainage; 60 million on the Mississippi drainage—east and west; and 180 million on the remaining far-western watersheds. Half of the mountain land is now owned by the nation, almost all of this being contained in the National Forests of the Rocky Mountain, Sierra and Cascade ranges. The National and State Forests contain over 60 per cent (about 130 million acres) of the mountain lands in this western region; but they contain less than 10 per cent (about 4 million acres) of the

important Appalachian and Atlantic watersheds. Hence nearly 40 per cent of the far-western mountain land is privately owned, and over 90 per cent of the eastern mountains. A small part of these private holdings can be bought by the nation or states and added to the publicly-owned forests, but all forest and grazing operations on the rest of these lands, if they are to serve their national purpose, must be conducted under some form of public regulation.

ESSENTIALS FOR PREPAREDNESS

"IT is essential, therefore, that the existing National Forests should not only be maintained and the necessary machinery for their protection and management fully provided, but their area should be extended; in the Appalachian region by purchase and in the western forests by consolidation and extension, wherever possible, through the exchange of timber for privately cut-over land and inclusion of the remaining timbered domain. This should become the recognized policy of the Government.

"The most wealthy and progressive states should set the example of acquiring for permanent forest purposes land which is unfit for agricultural use, particularly that to which title is surrendered for nonpayment of taxes. The acquisition of timber lands by municipalities, also by corporations of long life and semi-public nature which may be interested in the holding and management of such timber lands for financial reasons and which at the same time would guarantee their perpetuation, should be encouraged. In the case of municipalities in particular, the communal forests may be utilized not merely as a source of revenue to the city or village but serve as a recreation ground for its population and as a means of giving employment in the time of industrial depression.

"The proper development and protection of our forest resources could be made to help to solve, at least to some extent, the problem of unemployment and in this way alleviate a great social evil. It is of vital economic importance that the timber resources of a country should be handled in such a manner as to provide continuous and permanent work for a large number of people away from the industrial centers. The unrestricted exploitation of timber resources by private initiative gradually reduces the opportunity for employment of labor on land. Such labor then naturally drifts to the cities and aggravates the labor situation. It should then be the policy of the Government, states, and municipalities, to maintain and develop the forest resources under their control and adopt such constructive measures as may tend to stabilize the condition in the lumber industry, and in this way keep as many people as possible permanently employed on the land itself. In big cities in which unemployment during the winter months is now almost a chronic condition, a municipal forest of several thousand acres could absorb at least a part of those unemployed who have had experience in the woods or on the farm and would tend to relieve the situation.

A NATIONAL CONSTRUCTION RESERVE

THIS brings up another possibility which deserves careful consideration, namely, the use of the organizations charged with large conservation undertakings such as forestry and use and control of water, in the actual defense of the country in the time of need. It has been suggested that the system for national defense in the United States should embrace a national construction reserve organization primarily to fight nature's forces. Such a reserve enlisted in the name of constructive human advancement will provide the best school for the development of true patriotism and knit this nation more closely together in one common purpose. Whatever merit such plan may have, efficient national and state forest organization may be counted upon to furnish splendid material for such national reserves. They could be used as an adjunct to the military forces in mountainous and forest regions. Their intimate knowledge of the country and its scanty population, their ability to construct trails, bridges, telephone lines and signals and act as scouts and patrols will make them invaluable in local operations.

"In addition there is now a large body of technically trained foresters in this country who, because of their intimate knowledge of forest utilization, can contribute in a large measure to the most advantageous use of the forest resources now available, discover new uses, and find new fields for wood where possibly some other more valuable material has been used before. The services of such a profession, which is comparatively new and is inspired with the desire to serve the country, are bound to bring about more efficient use of our forest resources and add strength to the nation.

"It is not enough for as large a continent as the United States to have a great portion of its land under timber. It is also essential that this forest area should be as equally distributed as the soil and climatic conditions permit. In the older countries of Europe with a dense population it has been found that it is inadvisable in any locality to reduce the area under forest to less than a quarter of the total land area. In this country there are probably states where it will be advisable to maintain the greatest part of the land under forest cover as the most suitable and profitable crop. There are other states, like our prairie states, where, because of the high agricultural value of the soil and climatic conditions, the area under forest need not be very large. In most states which originally were largely timbered and which because of the large area of nonagricultural land there should be maintained a fairly large area permanently under growing timber crops. Wherever there is a question of the use of land for the production of agricultural crops or production of timber crops, the land if it is suitable at all for farming should be devoted to the production of agricultural crops; but land which is not suitable for agriculture should always be maintained under timber crops. Such balance between agricultural and forest land

will prove most advantageous to both agriculture and forestry.

"In a word, what is needed, as far as forest resources are concerned, in this country to make it truly efficient and strong is to place the utilization of these resources upon a permanent basis. Wherever forests exist on non-agricultural land they should be handled so as to be both a source of permanent employment and ever-increasing national wealth. And if national efficiency and strength mean anything more than a decorative phrase all those having the best interest of the nation at heart will work to bring about the permanency of the forest industry in the United States."

The committee said in conclusion:

"Recognizing what can be done and what has already been accomplished in the conservation of American forests, we as a committee of this Congress stand firmly behind the great constructive work of the National Forest Service and the Forestry Departments of the several states. We believe that the progress of forestry is intimately dependent upon forestry research and public education. We, therefore, approve of the great work of the Forest Products Laboratory at Madison, Wisconsin, and of the forest experiment stations maintained by the nation and by the States and educational institutions. We believe that the well-organized work in forest education in this country assures permanent progress in American forestry. We commend the new spirit of cooperation on the part of the lumbermen in the solution of the problem of efficient forest utilization and conservation."

PRE-REVOLUTIONARY FORESTRY

VERY interesting booklet has been issued by Cornell University on pre-revolutionary forestry in America. Contrary to the general impression that American forestry is of very recent growth, it is pointed out that such first principles as the prevention of forest fires developed with the first American settlements. Only six years after the Pilgrims landed at Plymouth Rock, the colony passed a law aimed to prevent the exhaustion of the local timber supply, and soon after a forest fire law was enacted, prohibiting the setting of forest fires or even the burning of private lands except during certain seasons. Similar laws were enacted by the Massachusetts Bay Colony, the New Haven Settlements, the Providence Plantations, Pennsylvania, and others at about the same or even earlier dates.

Some of the penalties prescribed were very curious. The law of North Carolina compelled the offender to pay a fine of 25 pounds, or, lacking this, "to receive on his bare back thirty-nine lashes, well laid on." Burning of the woods, the law declared, is "destructive to cattle and hogs, extremely prejudicial to soil, and oftentimes of fatal consequences to planters and farmers, by destroying their fences and improvements."

The Yosemite National Park

BY MARK DANIELS

Former Superintendent of National Parks

PERHAPS the greatest blessing which we enjoy in the possession of our scenic reservations is their great diversity of character and the unique individuality of each. It cannot be said of our National Parks that after you have seen one you have seen all of them, nor can the comparative merits of one be weighed against those of the other. In fact, it is impossible to honestly state that one is more attractive or fascinating than another after the individuality and unique characteristics of each are understood and appreciated. It is fair, however, to state that the individuality of the Yosemite National Park is more quickly grasped and will frequently leave the most lasting impression in the mind of the itinerant visitor.

The Yosemite National Park lies on the western slope of the Sierra Nevada and extends from the end of the foothills to the very crest of these wonderful mountains which John Muir has named "The Range of Light." It was first brought to the attention of the people as an area justifying reservation when it was made a state park by the State of California. The boundaries of the state reservation, however, were just enough to enclose the Yosemite Valley itself. Perhaps this is the reason why so many consider the Yosemite Valley as constituting all of the National Park instead of its being only, in area, a very small fraction of the reservation, or it may be possible that the innumerable wonders and marvels of the Valley itself hold the visitor in silent con-



LAKE MERCED AND TRAIL

Lake Merced lies in the bottom of the Merced Canyon, a few miles above the upper end of the Little Yosemite. Another mountain inn of the Desmond Park Service will be built in the vicinity of this lake, within a few hours' walk from the top of Nevada Falls.

templation of its beauties until he suddenly realizes that his allotted stay is up. The fact remains, however, that the impression generally is that there is nothing to the Yosemite National Park other than the Valley itself.

The Yosemite National Park is more readily accessible than most of the others, being reached by a branch line from the main lines of the Southern Pacific and Santa Fe Railroads which traverse the great central valley of the San Joaquin. The terminal of the branch line is El Portal, from which the hotel on the floor of the Yosemite Valley is reached in an hour and a half by motor bus. El Portal is at an elevation of approximately two thousand feet above the sea level and is just a mile or so outside the Park boundary. The stage road follows the Merced River and climbs two thousand feet beside a roaring cascade to the floor of the Yosemite Valley. From El Portal to the floor of the Valley is but ten miles and in this distance the entire Merced River drops through a difference in elevation of nearly



ONE OF THE MANY BEAUTY SPOTS OF THE YOSEMITE

Mirror Lake is the Morning Mecca of the tourist in the valley. When seen in the early morning, before the canyon breeze is astir, its placid surface is a mirror that joins the rising sun in "clothing the palpable and familiar with the golden exhalations of the dawn."

two thousand feet, hurling its white spray against the canyon walls and moss-covered banks that border its course to the Valley below. As the road climbs, the canyon walls become more and more precipitous, until, near the top, a distant view of the top of the great El Capitan is had from occasional turns in the road. Waterfalls pouring over the sides of the cliffs become more numerous and impressive.

The road comes out upon the floor of the Valley after crossing the river at Pohono Bridge and swings along the southern side of the Valley close to the foot of Bridal Veil Falls, where the tolerant driver

will stop the machine long enough to permit the enthusiastic photographer to exercise his kodak on the Falls and the great El Capitan across the Valley. The floor of the Valley from this point to its head is almost level and the drive along it, were it improved even as well as the drives in our small village parks, would be one of the most fascinating and gloriously beautiful to be had in the world. Stretches of the river flowing between

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MIRROR LAKE, YOSEMITE

BY E. DITHRIDGE

Before the sun has climbed the rocky wall
Or yet the woodland day is well begun,
Perfect the mirror lies, revealing all,
Before the sun.

Down the steep cliff the lessening shadows run,
While startled echo answers when we call,
And earth and mirrored image seem as one.

Dimpling the lake, the fishes leap and fall;
Oh, hasten ere the web of morn is spun,
To gain this valley, this enchanters' hall,
Before the sun.

will stop the machine long enough to permit the enthusiastic photographer to exercise his kodak on the Falls and the great El Capitan across the Valley. The floor of the Valley from this point to its head is almost level and the drive along it, were it improved even as well as the drives in our small village parks, would be one of the most fascinating and gloriously beautiful to be had in the world. Stretches of the river flowing between



SARDINE LAKE, YOSEMITE PARK

This lake is on the Bloody Canyon Trail to the east of the crest about two miles from the eastern border of the park. There are several glaciers in the neighborhood whose waters mingle with the little stream from Sardine Lake in the salt waters of Lake Mono. The fact that an automobile can be driven to within a few miles of this spot seems incredible.

grassy banks and meadows are visible here and there. The shadows of cliffs half a mile high are thrown like patrician gules across the golden green of the meadows and the tawny road. At the head of the Valley, forever dominating the entire gorge with its dignified and imposing sculpture, the great Half Dome rises to a height four thousand feet above the floor of the Valley. On the south side opposite the hotel, the Sentinel Rock seems to have been set on a cross-axis as an opposing feature to the half-mile-high Yosemite Falls on the north. In the early part of the season, say in June, the roar of the river as it drops in three leaps through exactly one-half mile of vertical distance, will set the windows of the old frame hotel a half-mile across the Valley rattling like castanets.

The contrast between the conditions in this Park, where waterfalls and cascades abound, and the dessicating dryness of the Cliff Dwellings in Mesa Verde National Park is an excellent example of the extremes that are encountered in our scenic reservations. With the unlimited amount of water, it naturally follows that all

verdure is growing in superabundance. As a result, it is my opinion that the most striking characteristic of the Yosemite is the profusion and lavishness with which nature has planted and built. Some people contend that Yosemite means Big Bear and others have their own preferred interpretation, but whatever it may mean when literally translated, the many months I have spent there have inalienably associated it in my mind with Abundance. The Valley in the early summer, with its roaring waterfalls, the beautiful Merced River nearly overflowing its banks, the fields of azaleas, the wildflowers, the blossoming dogwood and the golden green meadows brings nothing to my mind so strongly as the thought that here is nature's cornucopia.

Mr. Muir tells us that while the whites have named the Valley "Yosemite," it is still, as ever, in the mind of the Indian "Ahwahnee." It is a pity that we did not cling to the Indian name and it is to be regretted that one by one the musical Indian names are being supplanted by the harsher English ones. I wonder how long it will be before Pohono will be a forgotten word and a new

bridge in the location of the present named "Smith's Bridge." How long will it be before that glorious canyon named after the great Chief Tenaya will be called "Brown's Fork?"



Photograph by Mark Daniels.

AWE INSPIRING IF NOT BEAUTIFUL

Isberg Pass presents a cold and sinister front. It is pervaded with an atmosphere of desolation that fills the traveler with trepidation, discourages small talk and stifles any budding inclination to levity.

Until recently a more or less unhappy state of affairs has existed in the Yosemite National Park. There has been a superabundance of that class of competition which ruins service. In their efforts to satisfy the demands of their constituents, those with authority have granted permits with a lavish hand, excusing their actions with the statement that this was competition. As a result, there has been little or no service until recent years, and as to getting out into the Park and climbing to the high levels, such a thing was only for the man whose wealth placed the necessary pack train, horse wrangler, cook, etc., at his disposal. As to service stations in the Park outside the limits of the Yosemite Valley, that cherished competition which broke down all possibilities of a living profit made such a thing entirely out of the question. Yet there are in this vast park five hundred and ninety miles of trails and circuit after circuit of the most beautiful scenery that can be had in these United States. It is of course almost

identical with the scenery of the Whitney country, the difference being a more plentiful supply of snow and water and a little less impressive height.

The trails are so arranged and constructed as to make certain circuit trips quite practical. The visitor may choose a one, two, three or four-day trip and so on up to twenty days. There is the trip to the Hetch Hetchy Valley going over by the Yosemite Falls trail and returning by the road. There is the circuit that runs out from the Valley along the Tuolumne Canyon and back by Tenaya Lake and there are a dozen others, but the one that is most interesting to me is the circuit that takes you out of the southeast corner of the Park and back by Merced and Washburn Lake. It cannot be said that this is more beautiful than many of the other circuits, but there is a wonderful diversity of scenery along the trails interspersed with occasional stretches of soft and comparatively level trail through the meadows and great forests.

The circuit begins with the trail up to Glacier Point, from whence one of the finest views of the Valley may be had, providing the observer is so fortunate as not to be in the rear of several dust-kicking horses. Even if such a misfortune might close one's eyes temporarily, there is plenty of snow water which, added to soothing lotions that may be purchased at the little store on the top of the point, will adequately serve to restore clear vision. From Glacier Point the trail follows along Illilouette Creek to its junction with Buena Vista Creek. From this point a new trail has been built along Buena Vista Creek past unnamed lakes, over the summit of Buena Vista Crest to join the old Moraine Meadow Trail. The entire trip on this new trail is a succession of wonderful views, beautiful lakes and cool forest shade.



Photograph by Mark Daniels.

HOW THE TOURISTS TRAVEL

Approaching Fernando Pass is like playing hide and seek with a phantom, for each turn shows the pass apparently as far away as it seemed to be from the last. The pass is at an elevation of 10,175 feet above the sea.

The ordinary traveler will not be able to reach Buena Vista Crest on the first day, providing his trip has been prompted by a love of scenery, and a camp of unusual charm may be found in any one of several meadows along Buena Vista Creek. An additional advantage in stopping before reaching Buena Vista Crest is the glory

frog jump in comparison to the greater heights that must be scaled in order to get out of the Yosemite Valley. In addition to this, the view along the trail is more open and interesting so that the ascent is made with comparative ease.

On arrival at the summit, the minarets and the



Photograph by Boysen, Yosemite.

LAKE TENAYA IN YOSEMITE PARK

This lake is about half-way from the Yosemite Valley to the summit of the Sierra Nevada. The Desmond Park Service Company will build, in the near future, a mountain inn on the shore of the lake and will operate a line of auto stages from the new hotel on the floor of the valley to the lake and the snow-capped peaks beyond. No longer shall this exquisitely beautiful lake be a hidden gem of the Sierras.

of an early arrival at the summit of the ridge from whence the Valley of the Illilouette and the peaks to the east of the Yosemite Valley form a startling array in the early morning sun.

There is nothing really difficult after Glacier Point is left, until the ascent to Fernandez Pass is begun. The trail to the Pass leads through some rather rocky country and skirts the northern side of the glacial cirque which holds Breeze Lake cupped in the hollow of its granite walls. From the last turn in the trail that gives a view of Breeze Lake, the way steepens and the going becomes less and less easy.

The total ascent from Moraine Meadows, which is generally made the second night's camp out, to Fernandez Pass, is only about fifteen hundred feet, a mere

Ritter group burst on the view with startling suddenness. This group of saw-tooth peaks is the finest to be had in the northern Sierra and was at one time contained within the boundaries of the Yosemite National Park. The Government, however, no doubt on the recommendation of some official whose knowledge of snow-clad peaks was born of long experience in the fastnesses of Long Island, saw fit to eliminate a great area to the southwest of the Yosemite National Park which contained not only the Ritter group but hundreds of lakes and unusual examples of volcanic formation. As a result of this action, the trail after crossing Fernandez Pass is outside the present boundaries of the Park until it again crosses the line at Isberg Pass. The trail, of course, cannot be kept up with the same care that National

Park trails do, or should, receive, and here and there, between these two places it is rather indistinctly marked.

The passage from Fernandez Pass, down to the ravine below, is perhaps the most difficult and terrifying portion of the entire circuit, but it is not in any way dangerous. After reaching the headwaters of the west fork of Granite Creek, the character of the scenery changes materially. The trail leads through forest cover and over more or less rolling country until it begins the ascent of Isberg Pass on its way into the Park again.

The Indians once had a picturesque name for Isberg Pass, but the committee on names saw fit to change it to Isberg. Would that they might in their frantic efforts to change names revert to something more in keeping with the dignity of lofty places!

From the base of the precipitous portion of the slope, leading to the Pass, to the top there is little or no foliage and for the last thousand feet of the climb there is nothing visible except great boulders. The trail is poorly marked and rather difficult to keep on. The knowledge of the fact that it would be practically impossible to cross the summit at any other point than at the Pass is not particularly encouraging even though one is repeatedly told that if upward progress is continued the Pass must eventually be found. All thoughts of safety and security seem to be driven from the mind by the curiously desolate and abandoned aspect that pervades the entire scene surrounding Isberg Pass.

It is with a sigh of relief, therefore, and a feeling that

home is near at hand that warms the heart and steadies the shaking knees of him who recognizes Red Peak, Gray Peak and Mt. Clark silhouetted against the western sky. These peaks were on the east for the first day out, and to find them again, this time to the west, makes one feel that they are a sort of anchor to the windward.



THE YOSEMITE FALLS CAMP

The camp lies at the foot of the falls, cooled by the breezes created by the half mile of falling water. The camp is operated by the Desmond Park Service Company under the direction of the Secretary of the Interior, and offers, for the first time in the history of our National Parks, that degree of privacy in camping life which is so essential to comfort. The enthusiastic approval with which the establishment of this camp, where real service is rendered, has been greeted by the public, should be a source of real satisfaction to the Secretary.

The view from Isberg Pass is one of the finest to be had in the Park, for from this ridge the minarets and Ritter group are prominent to the east, while Gray Peak and Red Peak cast their long afternoon shadows almost at the foot of the ridge over which the trail passes. The descent from Isberg Pass is not at all arduous. From the summit to the small plateau at the foot of the ridge the trail is in decomposed granite and earth almost throughout. As a matter of fact, from Isberg Pass back to the floor of the Yosemite Valley, with the exception of one or two short passes,

the trail is surprisingly easy going. There is a steep pitch into the Lyell Fork Canyon of the Merced but the trail is very good.

Just before reaching Lyell Fork, there is a promontory to the left of the train which overhangs the upper basin of the Merced, in which is Washburn Lake. The promontory is almost half a mile above the Lake below and from it a view down the Canyon of the Merced shows Washburn Lake in the foreground with a tip of Merced Lake visible in the distance. If there are any views in the Sierra which I would travel fifty miles on horse to witness, this is certainly one of them

From the Lyell Fork on to the floor of the Canyon of the Merced River, the trail is well built and easily negotiated. It reaches the River at the Junction with the McClure Fork, at which point the trail forks, one branch leading to the Yosemite Valley and the other leading a few miles up the river to Washburn Lake. If fishing grounds are one of the objectives, the Washburn Lake Fork is by all means worth taking.

The Lake lies in the bottom of a great granite canyon protected from nearly all winds so that its smooth surface looks like the polished facet of a sapphire. The banks are sufficiently free of growth in places to make fishing, even for the amateur, a delight by obviating the necessity of climbing trees to release vagrant fish hooks.

The trip down the Merced Canyon passes along Merced Lake, another and larger sheet of water, climbs the shoulder of the upper end of the Little Yosemite Valley, skirts the base of the towering tops of Cloud's Rest and Half Dome and enters the Valley by the way of Nevada and Vernal Falls, alongside which the trail drops through an altitude of over two thousand feet in about a mile and a half.



Photograph by Mark Daniels.

MERCED RIVER CANYON

The view across the upper reaches of the canyon shows Mt. Clark, Gray Peak and Red Peak towering between three and four thousand feet above the river. While they are not as high as the peaks of the main ridge, they present a most imposing spectacle from the east side of the canyon.

This circuit, properly taken, should occupy from six to eight days in order that the scenery along the route may be properly appreciated and when it is realized that after such a trip only a very small portion of the Park indeed has been seen, some conception of the magnitude of the area of the Yosemite National Park can be obtained. In addition to this trip, there is the circuit which leads one over the Tuolumne Pass down into the Lyell Fork of the Tuolumne River, with a side trip to the Mt. Lyell Glaciers and back to the Valley by the

way of Tenaya Lake. If a fifteen or twenty-day trip is wanted, there is the northeastern corner of the Park and the Tiltill Mountain district away to the north of the grand canyon of the Tuolumne and the Hetch Hetchy Valley, where few people ever go. And there is the circuit that skirts the upper rim of the grand Tuolumne Canyon, the easy trip either by motor or horseback to the Hetch Hetchy Valley, the motor or saddle-horse trip to the Mariposa Grove of Big Trees and almost innumerable others.



Photograph by Mark Daniels.

TWO FAIR TOURISTS

An unnamed lake at the foot of Buena Vista crest. Fortunately some of the beauties of this park have escaped the fate in names that befell "Rafferty Peak" and "Isberg Pass." What the future holds is a matter of conjecture.

The fact, however, that these trips necessitate the employment of a pack train, cook and horse wranglers makes their cost prohibitive to many. As a result, only an extremely small percentage of those whose footsteps lead them to the Yosemite National Park ever see much more of the Park than the Yosemite Valley itself. This condition of affairs has really been tantamount to making two parks out of the Yosemite National Park, one for the poor people, which is the Valley itself, and the great hinterland of the Park, which is only for those whose purses are well lined. The concessionaires, until recently, have taken full advantage of this state of affairs, and have dictated not only to the tourist, but to the Government, as to who, when and how they would take tourists into the remote regions of the Park. There being no one in Washington who was thoroughly familiar with conditions, it was a simple matter for the concessionaires to make plausible excuses for lack of service, and combinations were made amongst concessionaires to the end that one should perform a service in one district and another in another.

Two years ago Secretary Lane took it upon himself to investigate conditions and determine whether or not something practical could be done in the way of open-

ing up this vast area in which there is much more scenery condensed in the space of three-quarters of a million acres than there is in all Switzerland.

There had been in the Valley so many concessionaires striving for the patronage of almost each tourist as he came into the Valley, that conditions were rapidly becoming so obnoxious as to discourage travel. In addition to this, there were in certain instances two or three times as many concessionaires as the revenue could support. Without entering into details it is sufficient to state that eventually a concession was granted to the Desmond Park Service Company which calls for the operation of a motor transportation line over the Tioga Road,



Photograph by Mark Daniels.

GROWING AND THRIVING AMID THE GRANITE

The wonderful trees of the region give evidence of the fact that strength and sturdiness are frequently the result of overcoming obstacles. The mountains are granite and the fact that trees can find nourishment is a never-ending source of wonder.

traversing the Park in an easterly and westerly direction, approximately in the center of the reservation. This company will, in addition to the operation of transportation by motor bus over the roads in the Park, establish a chain of mountain inns to be built along the lines of the various circuits in the Park so that in the course of several years it will be possible for a tourist to take these circuit trips on foot or mounted on the hurricane deck of a trusty mule carrying with him nothing more than the proverbial tooth brush and kodak. The Park Service Company will also build a large hotel which they will operate in addition to the camps now established on the floor of the Valley, to the end that all

classes of those whose love of scenery and nature leads them to this glorious Park, shall find it within their means to enjoy the glories thereof.

It seems incredible to those who cherish the Yosemite National Park as a heritage that the time has at last come when real service with a capital S is going to be rendered to all comers regardless of their financial status or the degree of their intimacy with either members of Congress or active concessionaires.

Think of the possibility of a sojourn in the Yosemite National Park, driving from one mountain inn to another, each only a few hours' walk from the other, with no thought of hobbled horses or spoiling provisions and marking the days of the calendar with notches in the bark of a walking stick. Such is the dream that Secretary Lane and his assistant, Mr. Stephen T. Mather, have undertaken to bring into realization in the Yosemite National Park and, with the great problem of selecting the right man to carry on the work properly solved, their task seems to be in a fair way of eventual solution.

VERNAL FALLS, YOSEMITE

By E. DITHRIDGE

"I will open rivers in high places and fountains in the midst of the valleys."

Beautiful! Dost know how I love thee?

Others have gazed on thy beauty and gone their way;
I worship the rainbow that hovers and bends above thee,
I bathe my face in the cool of thy drifting spray.

Here is the isle thou hast kept for the traveler weary,
Safe and shaded, and sheltered from sun and dust;
Here would I rest for an hour, who love and fear thee,
Learning thy secret of strength and unfaltering trust.

There is no sound in my ears but the voice of thy thunder,
Hymning an anthem of confident faith and praise,
There is no thought in my heart but a reverent wonder,
A joy that is pain, and a knowledge of God as I gaze.

Here is the place that the ages have treasured holy,
Here is the haven that waits when the height is won,
Far from the crowd, where the worshiper wanders slowly,
Loath to leave thee and go at the set of sun.

Beautiful! Dost know how I love thee?

Soon, too soon must thy beauty be left behind;
Still shall I dream of the rainbow that floats above thee
And hear thy call in the voice of the winter wind.

PREMIUMS FOR MEMBERS

If readers of **AMERICAN FORESTRY** will look beneath the table of contents in this issue they will see an attractive offer made to those who wish to aid the Association by helping to secure new members.

The Conservation Congress and National Forest Conservation

IN passing the resolution on public lands, the Sixth National Conservation Congress at its recent Washington conference has, intentionally or otherwise, placed itself on record as diametrically opposed to the policy of National Forests, and in favor of their dissolution. The resolution reads: "The established traditional and sound policy of the United States with respect to the disposition of its unappropriated public lands is opposed to the making of a direct revenue thereby, beyond the expense incident to the surveying, classification and disposing of such lands; on the contrary, said policy is intended to encourage and promote the settlement and development thereof; and any act of Congress, or any administration construction thereof which is not in harmony with this policy does an injustice to the new states by placing them on an unequal footing with the original states, and by preventing the settlement of such new states and the development of their resources."

It is needless to point out that since 1891 it has been the "traditional" policy of the United States to retain permanently as public domain forest lands more suitable for forestry and watershed protection than for agriculture or mining, and that six successive presidents have set the seal of their approval upon this policy by withdrawing, under proclamation, and not by act of Congress, a total of 160 million acres of such lands. The law of 1891 authorized "the making of a direct revenue thereby" in providing for the sale of timber and other resources. "Administration construction" of this law inaugurated the custom of charging grazing fees to National Forests, by which it became possible to regulate the use of this resource. This construction, which the resolution condemns as "opposed to the traditional and sound policy of the United States," was upheld by a decision of the Supreme Court in two separate instances and is as much a part of our public land

policy as the Homestead Law itself. By stating that this "policy" discourages and prevents settlement in these states, the resolution conveys the impression that agricultural lands are being withheld from settlement by these reserves, while in fact, the policy of the government is to list for settlement every acre of true agricultural soil lying within the reserves, as fast as it can be examined and classified as such. "Retardation of development of resources" is equally misleading. What resource is meant? Not forest grazing, which is developed on more favorable terms to the stockman than could be secured from states or individuals; not agriculture, for agricultural lands are never retained; not mining, for mining claims can be located on any public land inside or outside of National Forests. Not even timber, as lumbermen can buy National Forest timber on terms so liberal that there is a tendency on the part of some other owners of forest lands to complain of unfair competition in sale of National Forest stumpage. Perhaps waterpower is meant, and the entire purpose of this resolution is to create the thought that the Government should not retain title to waterpower sites nor charge anything for the use of such sites on terms both fair to the public and the capital to be invested for fear of blocking the development of the resource. But if this is the real meaning of the resolution it has not been clearly expressed.

As it stands this resolution places the Washington conference of the Conservation Congress on record as repudiating the National Forests and conservation policy of six successive administrations, a policy firmly rooted in the institutions of the West and of the entire nation. Such action will not receive the support of the public and will go far to discredit the National Conservation Congress as a means of expressing popular thought and public policy on national conservation.

CHARLES LATHROP PACK.



The Bird Department

By A. A. ALLEN, PH.D.

Assistant Professor of Ornithology, Cornell University, Ithaca, N. Y.

THE NESTING OF THE BIRDS

ANYONE who examines the beautifully woven nest of the oriole, or inspects the tiny lichen-covered home of the humming-bird, or even watches the robin plastering his rough abode, must wonder at the skill with which the coarse material is so neatly arranged. No shuttle is necessary to tie the knots that fasten the oriole's nest to the branch, no loom to weave the bag that must

the young. The little sticklebacks of our ponds and streams build real nests of leaves and stems of water plants and fasten them into the aquatic vegetation like the nests of birds. But it is from none of these that the birds have developed or acquired the nesting habit. We must look to the reptiles for its origin because it is from lizard-like creatures that the birds have sprung.

The earliest known creature which we can recognize as a bird was found in the lithographic stone of Bavaria in 1861 and is called the archaeopteryx or ancient bird. The chief differences between it and the bird as we know it today is the presence of teeth upon its jaws, a long lizard-like tail bearing feathers upon each side, and three free fingers upon each wing, showing that it climbed about the trees in addition to sailing from one to another. Whether it was a cold-blooded or a warm-blooded animal, we are unable, of course, to determine, but it was prob-



NEST AND EGGS OF THE KILDEER

Showing what is perhaps the first stage in the evolution of a nest, a simple depression in the gravel, with no lining.

hold the growing family. Very deftly the bird's bill plys in and out and fashions a nest that might well defy the skill of man to imitate. Why do birds build such elaborate structures? How do they come by such ingenuity? What is the meaning of the many kinds of nests built by different birds and how has it all come about?

Nest building is not restricted to birds, not even to the higher animals, for many insects make quite elaborate structures for protecting their eggs. The strange nests of many ants and bees and the care that is bestowed upon the eggs and young are in many respects much more wonderful than the structures built by birds and the attention given to their offspring.

With the vertebrate animals, we find true nest-builders among the fishes. There are many species of bass and catfish which deposit their eggs in shallow depressions in the lake bottom and remain to guard them and protect



AS IN THE EARLY BIRD DAYS

The nest and eggs of the green heron, a crude platform of sticks representative of the earliest tree nesters.

ably intermediate, having a body temperature above that of its environment but subject to variation. Its nesting habits were probably but little more advanced than those of reptiles today which deposit their eggs in the sand, in decaying vegetation or in holes of trees and leave them for the heat of the sun to hatch. In fact it was not until birds became truly warm-blooded creatures, with the

necessity for keeping the body heat at a fairly constant temperature that the need of incubation arose. The heat of the sun or the decaying vegetation proved too inconstant to satisfy this requirement of the embryo and so it became necessary that the heat should be supplied by the body of the parent bird. The birds then ceased burying their eggs and began laying them in places where they would comfortably sit upon them. Those that had been laying them in holes in trees perhaps continued to do so and their descendants still do today so that we find all of the woodpeckers, the rollers, the barbets, the toucans, the hornbills and the trogons still nesting in holes in trees. The saw dust or soft wood at the bottom of the cavity has served as a nest and, even today, no nest is built at the bottom of the hole by these birds. The same is true of the kingfishers and bee-eaters and some of their allies which make burrows in the banks of streams. Birds like the chickadees, nuthatches, wrens and bluebirds that build well-formed nests at the bottom of the cavities have probably come back or reverted to a hole-nesting habit and are descended from birds that nested among the branches of trees.

The descendants of those birds which scratched holes in the ground and buried their eggs, when the time came that it was necessary to incubate, met with more difficulties than the hole-nesters. There were storms and floods to combat, the coldness of the ground, and nu-



EGGS OF THE WHIP-POOR-WILL

This bird builds no nest whatsoever, laying its eggs on the leaves of the forest floor with apparently little concern for location.

merous terrestrial enemies. The various ways in which the different species of birds adapted themselves has given rise to the many types of nests which we find today serving as receptacles for holding the eggs and young and giving protection to them and to the incubating bird. A consideration of the resulting structures proves a most interesting subject for thought and conjecture for among

our present day birds we find every gradation from the ancient reptilian habit of burying the eggs to the more elaborate affairs we first mentioned.

Among the brush turkeys and mound birds of Australia and the South Sea Islands, for example, we still find birds which come down from the forests to the ocean beaches at the breeding season and scratch holes in the warm sand in which they deposit their eggs and after covering them, leave them entirely to the heat of the sun to develop; just as their relatives, the great sea turtles, migrate from the sea to the same beaches to deposit their eggs. The Egyptian plover and the ostrich are likewise said to cover their eggs with sand and leave them for long intervals to the heat of the sun. The regular practice of the ostrich, however, is to incubate much like other birds, the female taking her turn during the day and the male at night. The Australian



SOMEWHAT OF A CARPENTER

Nest and eggs of the catbird, built of sticks, but well lined with rootlets.

mound birds scratch together huge mounds of earth, leaves, and decaying vegetation of all kinds in which to lay their eggs. A curious fact in connection with the young of these birds is that they are said to hatch in a much more advanced stage than any other birds, acquiring feathers while still in the egg and being able to care for themselves and even to fly almost as soon as they have dug their way out of the mounds, and like young reptiles, it is probable that they never see their parents.

The number of birds which have advanced but a step further and, although they practice true incubation, build no nest at all or at least very crude affairs on the ground, is still quite large and varied in its relationships. Among our familiar birds the nighthawk and whip-poor-will make no pretense at a nest, laying their eggs upon the bare gravel or upon the leaves of the forest floor with apparently little concern for the location. The same habit of building no nest is true of many of the sea birds

such as the auks, murrens and guillemots which nest upon cliffs and rocky islands. These birds lay but a single egg which is pointed at one end to keep it from rolling off the ledge.

The next stage in the evolution of the nest is shown by many of the terns, plovers and grouse which scratch depressions in the earth to keep the eggs from rolling and to permit of their being better covered by the parent bird, no nesting material at all being used. The sand-



BUILT WITH PAPER

Nest of a robin built largely from narrow strips of paper gleaned from the waste pile of a nearby paper factory. This material was selected simply because it was the most convenient, not from an aesthetic sense or desire to make the home beautiful.

pipers have advanced a step further and usually line the depression with grasses, likewise the ducks which use feathers from their breasts. The bobolink and many sparrows make well-formed nests in the depressions and the meadowlark and ovenbird even roof them over. Some of the thrushes, sparrows, and warblers and many of the marsh birds, which nest upon the ground, raise the nest above the surface by a platform of leaves or other material and perhaps by so doing secure better drainage.

Probably the desirability of raising the nest from the ground into the bushes and trees was felt very early for we still find among the tree-nesters those which build very crude nests, birds in which the nesting instinct is still poorly developed. The herons, for example, build crude platforms of sticks hollowed only very slightly to keep the eggs from rolling out and so thin that the eggs can be seen from below. The nests of the mourning dove and the cuckoos show but little advancement. A few rootlets may be added but the whole affair is flimsy and crude. The crows and hawks have progressed further for, although their nests are built of coarse sticks, they are always well hollowed and lined with bark and softer materials. From this stage on, the tendency is

for the reduction of the coarse material and the increase of the lining, greater choice being exercised in the selection of material and more skill evinced in building. The nest of the catbird would represent the next stage where sticks are still used in the outer layer, but the lining is neatly woven from rootlets. Straws and grasses next replace the sticks and hairs and strips of soft bark, the coarse rootlets as in the nests of the various sparrows and many of the warblers. The use of feathers and down for a lining might be considered further progress as in the nests of the goldfinch and yellow warbler.

In addition to the change from coarse to softer materials there has come greater skill in fastening the nest to the branches so that it has been possible to move them further and further from the center of the bush or tree to the outer branches where they are less accessible to the many enemies. And finally we have developed the beautifully woven pendant nests of the orioles and vireos,



THIS IS PARTLY DISGUISED

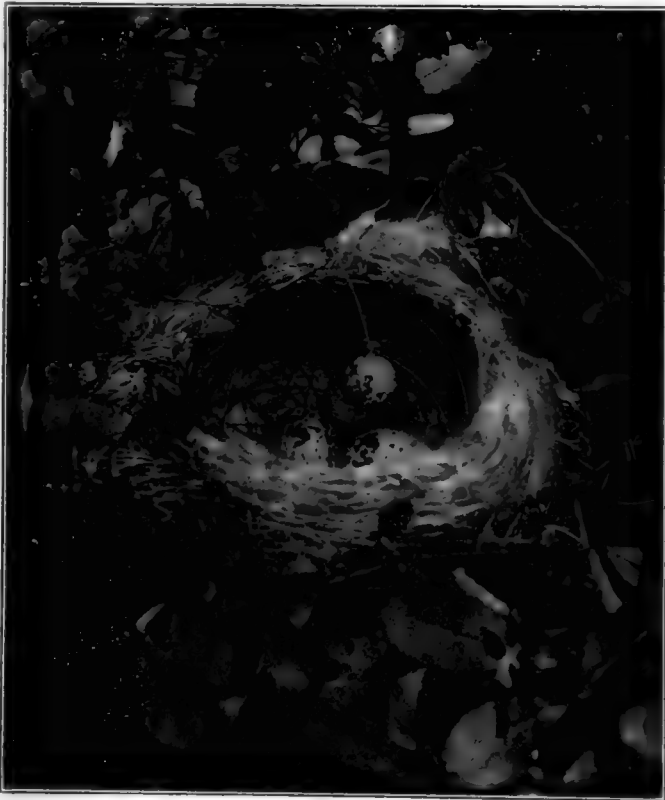
Nest and young of the hummingbird, the nest "decorated" with lichens to make it less conspicuous.

the strange nests of the Indian tailorbird, sewed into a large leaf; the wonderful balanced nests of the Indian and African weaver birds and the deep pockets of the South American cassiques, which are hung from the tip of a branch by a single strand.

The so-called "ornamentation" of nests we might likewise consider a recent development although little can be said in support of the idea that it is done from an aesthetic sense or a desire to make the home more beautiful. The nests of robins, thrushes and vireos, "decorated" with bits of paper or ribbon are the result either of the birds utilizing the material nearest at hand and therefore most convenient, or else an attempt, as in the case of the hummingbird and wood pewee where lichens are glued to the outside of the nest, to make it less conspicuous. The materials selected by birds are

always the most abundant ones in the vicinity, provided they lend themselves to the general type of nest which is characteristic of the species. Thus the bobolinks and meadowlarks use grasses, the woodland birds use leaves and rootlets, and the garden birds use strings, grasses, paper, etc. If some unusual material is very abundant, (as like as not) the birds will select it. There are instances of a European rook building near a clock factory and using broken springs instead of twigs, of crows using the old-fashioned wire stoppers of bottles, of house wrens using clippings from the wire netting and hair pins, of wood thrushes using rags instead of leaves and robins using almost anything provided for them. The accompanying photograph of a robin's nest built largely of narrow strips of paper is explainable by the nearby paper factory.

This gradual development of more elaborate and better constructed nests is due probably to the change from



ONE OF THE BEST ARCHITECTURALLY

Nest and eggs of the yellow warbler, built entirely of soft materials and representing one of the higher types of nests.

the precocial to the altricial type of young that has occurred with the evolution of the species. The former as in the case of the young grouse here shown are covered with down when hatched and able to run about and follow the parent bird so that no nest is required for their protection. The latter are hatched blind, naked and helpless and for a considerable time require every protection and attention. Some species are less helpless than others and these usually build less crude nests. The young herons, for example, which are hatched in crude platforms of sticks, soon crawl out on the surrounding branches and would be able to survive even should the

nest be entirely destroyed. Young hawks, on the other hand, are helpless for nearly a month and the nest is correspondingly superior.

There remains to be mentioned those birds in which the nesting instinct has become aborted, birds which never build nests of their own but depend upon other birds to hatch their eggs and raise their young. The European cuckoo and the American cowbirds are the



THIS TEACHES A LESSON

The nest and eggs of the Florida gallinule. Here a platform of reeds raises the nest above the water of the marsh and indicates the course that may have brought birds to nesting in trees.

best known of these parasites. The American cuckoos occasionally lay eggs in each other's nests as do also some of the species of wild ducks, rails, etc., but the European bird never builds a nest of its own, depositing its egg in some convenient place and then taking it in its bill and dropping it into the nest of a hedge sparrow or other small bird. Our cowbirds lay their eggs directly into the nests of smaller birds such as the warblers, sparrows and vireos. The young cowbird grows much more rapidly than the rightful young and is considerably larger from the start so that usually it gets most of the food and the other young are either starved to death or crowded from the nest. If the cowbird deposits its egg before the owner of the nest has laid any eggs, a few species of birds like the yellow warbler, redstart and vireos will build another floor over the strange egg, but seldom, if ever, is the egg thrown from the nest. Most birds, however, never seem to notice the intrusion and are quite as solicitous for the young cowbird as they are for their own young.

BIRD LIFE IN JUNE

June is the month for nesting. Of course many species begin to nest in May, some in April, and a few in February or March, but in the north temperate zone,

June is the month when by far the largest number of birds of all species are raising their young. It is the month when insect life abounds, when the weather is mild, when storms are few, the month, by all odds, the most propitious for the birds to undertake to increase their numbers. It is a month, however, when probably the largest number of birds are killed, should we take into account all of the young that meet an untimely



VESPER SPARROW'S NEST

The nest and eggs of the vesper sparrow, showing another stage in the nest-building instinct where the depression is well lined with grasses.

death, and the month when we should do everything we can to reduce the numbers of their enemies.

The maternal instinct, which knows not fear, brings many a mother bird into the claws of a marauding cat or makes it an attractive target for the untrained boy or the untutored foreigner with slingshot or gun. When the young birds first leave the nest they are just learning to fly and they perish by the hundreds from storms and from scarcity of food. But chief among all the agents of destruction is the stray cat and second we must put the well-fed cat. Every cat is naturally a bird catcher and those that are not sufficiently active to catch grown birds find an easy prey in the newly fledged young. It is during the early hours of the morning that most young take their initial flight and it is at such times that the cats go unrestrained. Every owner of a cat, every cat lover, and every bird lover should see to it that during this month, at least, cats with homes are kept indoors, caged, or tethered and that every stray, ownerless cat is captured and mercifully put out of the way. We can do a great deal toward increasing our native birds by attracting them to our gardens, with food, water and nesting boxes, but unless we feel some responsibility toward protecting them from this unnecessary and very dangerous enemy, the cat, it will not avail.

RESOLUTIONS ON FORESTRY

AT the conference of the Sixth National Conservation Congress, in Washington, D. C., early in May, the Forestry Committee presented the following resolutions:

Whereas, The conservation of our natural resources, the perpetuation of our forests, the regulation of our waters, and the development of agriculture are of vital importance for the highest national efficiency, commercial independence, and permanent prosperity to the American people, and are fundamental to true preparedness, be it

Resolved, That it is the sense of this Congress that public control of all of our natural resources by Nation, State and communities should be extended; and

Whereas, All the desirable influence of the forests in the mountainous regions, especially water regulation, are best conserved by public ownership, be it

Resolved, That the area of National, State, and communal forests be extended to include ultimately all such mountainous lands as are essential in the conservation of water and are more suitable for timber production than agriculture.

The Resolutions Committee of the conference recommended the following resolutions:

Whereas, In this great nation the forests are being consumed much more rapidly than they are growing, and

Whereas, An abundant supply of wood material is essential to the continued prosperity and strength of the nation whether at peace or at war, and

Whereas, Under an act of Congress approved March 1, 1911, popularly known as "the Weeks Act," purchases have been made at the headwaters of navigable streams, particularly in the White Mountains and Southern Appalachians, with the view to controlling the flood waters in all of the great rivers that rise within them, including the head waters of the Ohio River, therefore be it

Resolved, That the National Conservation Congress requests its members throughout the country to favor the continuation of this policy without cessation, and urges the Congress of the United States to reappropriate during the present session the three million dollars for this purpose that were appropriated in 1911, but which were not used at that time.

We reaffirm the principle heretofore enunciated by the National Conservation Congress to the effect that as conservative forest management and reforestation by private owners are very generally discouraged or prevented by our methods of forest taxation, we recommend state legislation to secure the most moderate taxation of forest lands consistent with justice, and taxation of the forest crop upon such lands only when the crop is harvested and returns revenue wherewith to pay the taxes.

THE CHILDREN'S DEPARTMENT

BY BRISTOW ADAMS

THE WOODS ARE CALLING

BY THE time this reaches you, wherever you may be, the trees will be in full leaf and calling you to the woods. They will still have the tender green of spring, whether they are broad-leaf trees or cone-bearers. With the former the new foliage takes the place of bare branches; with the latter the tender green seems almost to shine out in contrast with the older needles of last year.

Each year the ends of the branches push out a little farther. Already this spring the trees have added to their girth. Possibly it is only a little, some of our weeds which spring from a seed and complete their whole life before frost cuts them down, grow faster than most trees will. The wonderful thing about the tree, however, is that it keeps growing year after year, and thus takes its place as the oldest living thing. All over the northern half of the world at this time of year the trees are growing at their fastest, whether they be tropical evergreens or the little elfin trees which brave almost continuous arctic winter.

Strange as it may seem, the willows, which grow their largest in the warmth of the lower Mississippi Valley, can be found beyond the Arctic Circle. There, in order to live at all, they are little, creeping, vine-like plants almost like the trailing arbutus of our Eastern States.

Of course, you are going into the woods these days for Boy Scout hikes, or for picnics, or for the gathering of wild flowers, or to see the birds.

HOLES IN THE TREE'S ARMOR

LAST month we spoke of the possible danger to the woods from carelessness with fire. There are other forms of carelessness which are likely to do a good deal of harm. If you feel that you must cut your initials or "Hers" in the smooth bark of beech or cottonwood, do not get in too deep. The initials will last just as well if they do not reach quite to the growing tissue between the sapwood and the bark. You must remember that the bark of the tree is its armor and its protection against all sorts of enemies. The germs of disease can get in through these wounds, for the tree is just as likely to get diseases in this way as you are to get a disease germ through a cut in your finger. Insects, too, enter the wood of healthy trees when the armor furnished by the bark is removed.

Boy Scouts should keep these things in mind also when

they "blaze the trail" through the woods. For their purposes, since the record does not need to be permanent, a slight scar of the bark will suffice.

Also in the care of trees about the home a coat of paint or tar over a wound will help the tree recover from injuries. This is the simplest form of the tree doctoring or tree surgery, about which we hear much nowadays. Long before men took to the work of tree doctoring the tree itself had its own way of healing wounds by throwing a growth of callus over them. And their struggle against insects has always been aided by the birds as policemen. Doctor Allen, in the Bird Department, has told you of this service of the birds.

WHAT YOU CAN DO

SUMMING up, every boy and girl can do something for forestry and in a very practical way, by protecting the birds, by avoiding or repairing injuries, by planting new trees, by protecting insect friends and destroying insect enemies. If they can do no more than just pass their knowledge of trees "across to the other fellow" they will help create a good citizenship and an active public opinion for the support of forests.

When the writer of these articles was a boy, more years ago than he cares to think about, the study of hygiene, through what were known as health primers, was just being introduced in the public schools. These primers told a great deal about the bad effects of smoking and drinking. It is not too much to say that the present widespread sentiment against drinking, which used to be quite fashionable, is due to the lessons learned from the health primers by the children of yesterday. In the same way a sentiment for the preservation of our forests is bound to come, and every boy and girl can do something to hasten its coming.

LET US ALL DO OUR PART

IF WE do our part in the woods this summer and if a little more and a little better thought is given to the trees not only in each succeeding summer but all the year round, the United States can still be, as it ought to be, in its foremost place as a producer of the greatest number of different kinds of valuable timber, and in the greatest quantity. And the trees and the forest spaces will react upon our people in a constantly growing love of beauty and love of nature, which are very precious things for a nation to have.



Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

EDITED BY J. J. LEVISON, B.A., M.F.

Arboriculturist Brooklyn Park Department, Author of "Studies of Trees," and Lecturer on Ornamental and Shade Trees, Yale University Forest School

THE planting of street trees is a modern problem commanding the interest of communities, city officials and foresters all over the country. In the street tree the average citizen takes proprietary interest. It is his tree; he sees it daily, is directly benefited by it and expects it to be thrifty and sightly. The individual citizen, however, is in no position to undertake, independently, the planting even of his own tree because one of the most important essentials of successful tree planting is uniformity in every detail; only one kind of tree should be used on the same street or block, all must be of uniform size, and all must be set out at equal distances apart. Individual planting will not produce this uniformity, and just how to accomplish the best results is the problem that we aim to discuss in this paper.

The ideal way is to have the city undertake the planting of its city streets. But some cities are not yet prepared with funds or organization to undertake the work, and the only feasible course left for such cities, therefore, is for the residents of each street to cooperate and plant their own street uniformly. This has been tried with absolute success on several streets in Brooklyn and other cities, and the cost to abutting property owners ranged from \$6 to \$8 per house number. Why not try it on your street, and we will tell you

how to go about it. Someone on the block to be planted must be prompted by civic pride to become the moving spirit in the realization of the street beautiful. That person must be prepared to take considerable responsibility, to face many obstacles and with determination to proceed in this way:

First. Determine how many trees are needed, assuming that they are to be planted at thirty feet apart.

Second. Determine whether the soil will have to be replaced with material of better grade and see whether holes will have to be cut out in the pavements.

Third. Consult someone who knows trees and the local conditions as to what species would be best suited for that particular street. If there are many trees already present on the street, be guided, to a certain extent, by the predominating species and have the remaining trees of the same kind.

Fourth. Ask your local nurseryman to give you a price on planting the block with trees of the particular species, 2½ inches in diameter, and well formed. His price should include the cost of the tree, cutting the hole in the sidewalk, excavating and filling the cavity, cost of soil, guard, stake and guarantee for two years' growth.

Fifth. Find out how many house numbers there are on your street and block and determine how much each



A WELL-SHADED NEWTONVILLE, MASSACHUSETTS, STREET

The trees on this street are valued at \$2,016.01. Had these trees been sugar maples instead of poplars, their value would have been \$3,270.76.

property owner should be taxed for the trees needed.

Sixth. Get one or two of your neighbors to help you, thus organizing a nucleus, and send out postal cards calling for an evening meeting of the block residents at your own or at your neighbor's house. State briefly the purpose of the meeting and make it a semi-social affair. Have some prominent resident lay the proposition before the meeting and, if possible, let some park officials or someone else versed in the value and growth of trees present the benefits of cooperative effort and the need of the movement on the block.

Seventh. With the necessary data on hand, you can present the proposition to your neighbors in definite form and ask them to contribute their share. This cost will vary with the city, local conditions and kind and character of tree, and will range from \$6 to \$12 per tree. In Brooklyn the cost is \$8 per tree; in Manhattan it is \$13 or more, and in some cities we have known it to be much less.

Eighth. With your neighbors pledged, get to work at once to procure the planter and the trees.

While the above all seems systematic and easy of attainment our experience has been that there are many snags to overcome, and for that reason the work cannot be started too soon. Where planting is contemplated in the spring, it is wise to commence prep-

important boulevards, beautifying them greatly.

In Chicago several of the largest boulevards are laid out in the form of a parking, planted with both shrubs and flowers.

In Brooklyn all the newly built private residential streets are laid out with an oblong parking in the center



IDEAL PLANTING EFFECTS

On Waltham Street, West Newton, Massachusetts, small park in foreground. Trees on this street are valued at \$20,467.05. There are 1.4 miles of roadway and 221 trees.



A WELL-SHADED STREET IN WINTER GARB

Value of trees on this street \$7,752.92. Only the trees shown in picture included in this valuation. About one-half mile in length and 89 trees in that distance.

arations the previous summer, selecting the trees in the nursery in late summer and preparing the holes with soil, etc., in the fall. When spring arrives, there will then be no delay and the planting can be accomplished with greater success.

PLANTING PARKWAYS AND BOULEVARDS

Answering many inquiries regarding the planting of parkways and boulevards, I would say that in many of our cities it has been the practice to plant shrubbery along

designer, but consists principally of such species as:

- | | |
|------------------------|----------------------|
| Deutzias | Dogwood |
| Weigelas | Kerria |
| Forsythias | Symphoricarpus |
| Hydrangeas | Rhododendrons |
| Bush Honeysuckle | Judas Tree |
| Spirea Thunbergii | Yucca |
| Spirea Van Houttei | Euonymus alatus |
| Spirea Anthony Waterer | Japan Quince |
| Lilacs | Ligustrum Ibotia |
| Viburnums | Ligustrum Regelianum |

planted with shrubs, and in some cases, even with flowers. In many of these avenues there are oblong spaces reserved along the side of the street between the curb and the sidewalk, which are planted with shrubs.

In Boston the great system of boulevards which take the form of parks are planted with heavy masses of shrubbery along the edge. This is also true of the Essex County Boulevard in Newark, laid out and planted in recent years by one of our foremost landscape architects.

The shrubbery used for that purpose varies with the locality and the personal taste of the

Barbery
Rosa Rugosa
Ribes

Ligustrum Ovalifolium,
Ligustrum Vulgare and
Red-stemmed Dogwood

In some cases evergreens are used, but these are not generally advisable because they will not stand the dust and abuse of the average city street, as well as some of the shrubs mentioned.

ADVICE FOR JUNE

1. Destroy nests of tent caterpillars. Use torches, or kerosene, or spray.
2. Remove trees hopelessly infested with borers before the end of June, if you have not already done so. This only applies to cases which are so badly infested that treatment for the individual insect would be a hopeless task.
3. Spray for elm-leaf beetle in the early part of June.
4. Spray for red spider with tobacco solution, or fish-oil soap, in early June.
5. Cultivate, mulch and water newly planted trees and shrubs.
6. When blossoms have nearly fallen, spray apple and pear trees with Bordeaux mixture. Add three pounds of arsenate of lead to every fifty gallons of this spray for leaf-eating insects.
7. If aphid appears on elm, etc., spray with fish-oil soap.

QUESTIONS AND ANSWERS

Q. Two years ago I planted fine large specimens of Austrian and other pines around my residence in this city. These were obtained from the Hicks Nurseries, Westbury, L. I. Last spring, and now this spring, the yellow-bellied sap-suckers, a variety of woodpecker, have attacked some of these trees and are practically girdling them. Several of the trees, if not killed, will at least be badly devitalized. I write to ask if you have had any experience with these destructive birds and if you can suggest anything to be done, both preventive and remedial.

C. H. L., Buffalo, N. Y.

A. The woodpecker and other birds very commonly attack pine and other trees, through the bark in the method you describe, but it has been our experience that it never injures the trees seriously. In fact, in many cases the trees are benefited because the birds are almost always seeking insects, particularly the boring insects, which they dig out and eat. In the case of your pines especially you need not be greatly concerned, unless of course there is a very unusual condition, because the gum that exudes from pine trees immediately takes care of the wound, keeping out both disease and insects, and protecting it until it heals of its own accord.

Q. We would be pleased to have you advise us what is the best solution for spraying trees in this section of the State, such as Silver Maple, Norway Maple, and the ordinary trees that grow in this section as well as apple, pear, plum, etc., and what time the spraying should be done.

W. F. T., Utica, N. Y.

A. The question is put in such a general way that no definite answer can be given, because different insects require different sprays, and also require the sprays to be applied at different seasons of the year, depending on how early or late the young of the various insects emerge and crawl. As a general rule, all leaf-eating insects must be sprayed with arsenate of lead at the rate of one pound to ten gallons of water. All sucking insects, such as would be apt to affect the fruit trees, must be sprayed with oil emulsion, such as lime sulphur solution, kerosene emulsion, or

fish-oil soap. These solutions must be used with great care, and the strength of the solution will depend upon the individual insect to be attacked, and the particular season. If a specimen of the infested twig, or any particular problem is presented to us we can answer that particular question with greater definiteness and prescribe just exactly what to do.

There is another class of insects which I have not mentioned, and those are the boring insects, and in fruit trees they can best be handled by digging them out with a knife. In other trees, like the maples, they can be treated by an injection of carbon bisulphide, and in oaks, hickories, etc., they can only be eradicated by destroying the infested trees before the beetles emerge.

Q. We are developing several tracts of land, but are undecided as to the best method of laying out our streets, that is with respect to the position of our sidewalks and trees. The plans in question are as follows:

Original plan: Thirty (30) foot roadway, four (4) foot tree lawn between sidewalk and curb, four (4) foot sidewalk, and house fifteen (15) feet from the sidewalk. Planting in the space provided, or two feet from the curb line, would place the trees twenty-one (21) feet from the houses or thirteen (13) feet from the porch line.

Suggested plan: Thirty (30) foot roadway, four (4) foot sidewalk, adjacent to curb and house nineteen feet from the sidewalk. Planting trees two (2) feet inside the sidewalk would place them seventeen (17) feet from the houses, or nine (9) feet from the porches.

We are not in favor of placing the sidewalk so close to the street, as mentioned in the suggested plan, and our original plan seems to be the better from every point of view. Not wishing to permanently mar the beauty of our tract and realizing our need of assistance, we are therefore seeking your good advice in this matter.

D. R. G., Bethlehem, Pa.

A. Your original plan seems to me to be the best from every point of view. The trees being in their natural locations with plenty of room for growth, the appearance of the street would be far more uniform than the suggested plan.

Q. I have a small elm about 2 inches in diameter which has been barked. One of the small limbs was injured and when it was broken a strip of bark was torn down the trunk about $\frac{3}{4}$ of an inch wide and 15 or 18 inches long. I will, of course, cut off the broken limb, but how should I treat the barked trunk?

A. P. F., Bridgeport, Conn.

A. Cut off the rough edges of the torn strip of bark, removing it completely, so as to leave a clean, smooth edge of tight live bark. Cut this so that the upper and lower ends of this perpendicular wound taper, as this will facilitate the healing process. Never square such a wound at the top and bottom. Then cover your exposed wood within the wound with a coat of coal tar. Apply this with a small hand brush, neatly and carefully so that it will not drip over the bark of the tree, and be sure to see that every bit of exposed wood is covered. Such treatment should in time heal the wound and new bark will gradually cover the break.

Q. Can you give me information on tree-growing at the seashore. I have tried for three years, unsuccessfully, to have trees grow. I used the Carolina poplar and the Oriental plane. Am within, say, 200 feet of the ocean. On side protected by house trees grow well. On side unprotected have had no success at all, the trees having the appearance of being seared or burnt by fire. When planted they were all well developed. Can you suggest any species of tree, or give me any advice or suggestions to help in making trees grow where evidently Nature never intended they should.

W. N., Atlantic City, N. J.

A. In the first place, I think you would find the Red oak the best and most durable species for planting on your ocean side, with Scarlet maple as a second choice. The Red oak is a quick grower and a very beautiful tree, and if you secure the trees from the Hicks Nurseries, at Westbury, L. I., N. Y., and they are handled by the Hicks men, I think you would be safe in using trees from 15 to 20 feet high, but you will understand these large trees should only be planted and handled by experts. If you are planning to have the work done under private supervision, it would be much wiser to use the smaller trees. The soil should be rich with well rotted manure and bone dust—the richer the better—and the trees should have judicious watering. Perhaps the species you used before were not hardy enough or the soil conditions were not right. For hardy shrubbery I would suggest the Rosa rugosa, Rosa nitida, Spiraea thunbergii and Van Houttei, tamarisk and privets. These last two are particularly good for your location, sometimes thriving even where washed by the surf.

Mr. Pack as a Philatelist

MR. CHARLES LATHROP PACK, president of the American Forestry Association, is not only deeply interested in forestry and the general conservation of natural resources, but he has—besides extensive many other interests—a world-wide reputation as an expert philatelist, or collector of stamps. Having taken up this work many years ago as a hobby, Mr. Pack has acquired a collection of very considerable value and his researches, his discoveries and his contributions to philatelic knowledge have won him many honors.

He is a Fellow of the Royal Philatelic Society, of London, of which King George, of England, was president when he was Prince of Wales, and Mr. Pack has personal letters from the King in regard to his collections. He is also an honorary member of the Sydney Philatelic Club, the Philatelic Society of New Zealand, the Philatelic Society of Victoria and the Philatelic Society of South Australia in addition to being a member of various other philatelic societies in this country and abroad.

An evidence of Mr. Pack's world-wide reputation in this respect is found in quotations from two journals which have just come to hand:

The *Australian Philatelist* of April 4, 1916, says:

"There are few men better known in the philatelic world than Mr. Charles Lathrop Pack, one of the giant collectors in the United States, and a good many of us in Australia had the pleasure of seeing one of his fine collections at the last Philatelic Exhibition held in Sydney. But it is not as a stamp collector we have recently come across him. A friend of ours sent us a copy of *AMERICAN FORESTRY*, the official organ of the American Forestry Association, one of the leading—if not the leading—institutions of its kind in the world; and in its pages we came across the announcement that Mr. C. L. Pack, forester, conservationist, and financier, had been elected president of the association. A full-page portrait told us that it is the same Mr. Pack we know.

"Although this journal is published in the interest of philately only, we cannot but add our tribute to the remarkable qualifications of Mr. Pack, in one of the grandest pursuits in life, such as forestry is. Having ourselves had over 40 years' experience of all that pertains to the cultivation of the soil and the production of stock, and reading what Mr. Pack has done for forestry in the United States and part of Canada, an unceasing work starting from the 70's, we cannot but acknowledge that his specialism in philately is thrown far into the background by his specialism in forestry. His address to the annual conference, in reply to his being toasted as the new president, shows what a remarkable grasp he has of all that relates to forestry, and we feel confident that, if not the whole, the main part of it will be reproduced in

all countries where forestry has become a national question. We offer Mr. Pack our hearty congratulations."

The *Australian Stamp Journal* of April 10, 1916, comments on Mr. Pack's election as follows: "We congratulate Mr. Charles Lathrop Pack, of Lakewood, New Jersey, U. S. A., on his election to the presidential chair of the American Forestry Association. We gather from the February number of *AMERICAN FORESTRY*, just to hand, that this association is a very important one, amongst its vice-presidents being such people as Andrew Carnegie; Dr. Charles W. Eliot, President Emeritus of Harvard University; Hon. David Houston, Secretary of Agriculture; Hon. T. N. Page, Ambassador to Italy; Hon. William H. Taft, Ex-President United States, and other prominent American citizens. Although philately and forestry have nothing in common, we feel that the action of the association in electing Mr. Pack president reflects a certain amount of credit on philately, seeing that that gentlemen is one of its most prominent students."

SOUTHERN FORESTRY CONGRESS

A SOUTHERN Forestry Congress will be held at Asheville, N. C., July 11 to 15, inclusive. The work of the congress will be of a two-fold nature, part of the time being devoted to the study and inspection of forests, forest plantations, methods of lumbering, and means taken to prevent forest fires and results accomplished, and part to discussion of various problems relating to forestry. On Tuesday, July 11, there will be an excursion over the Biltmore estate for the inspection of the various forest plantations; on the 15th a trip in automobiles from Asheville to the top of Pisgah, through the Pisgah National Forest, then on through the Pink Beds and down Avery's Creek, to inspect the natural regeneration of hard woods where fire has been kept out, and also to inspect the cuttings that are being made under forestry supervision. The other three days, July 12, 13 and 14, will be devoted to pertinent questions relating to many forestry problems. These questions will be discussed by foresters of national reputation, by lumbermen and public men who are not professional foresters, but are interested in the protection and conservation of our forests, and members of women's clubs who are extremely interested in many of the problems relating to our forests, and who, through the conservation departments of their various clubs, are assisting in a very substantial way the forestry work in this country.

One day will be given over to a general forest fire conference. At this session methods of preventing forest fires and putting out fires will be discussed. The general subject of reforestation will also be considered,

and owing to the important educational work in connection with the development of forestry, considerable time will be devoted to discussing the best method of carrying on this work and keeping the question of the need of the protection and conservation of our forests before the people.

The Association of Eastern Foresters will hold a summer meeting with the congress. Governor Locke Craig, of North Carolina, who is very much interested in for-

estry and who was very instrumental in the passage of the various satisfactory forestry laws of North Carolina, expects to attend the congress and make an address.

The American Forestry Association is cooperating with the Congress and many officers and members expect to attend; the Society of American Foresters will meet in Asheville during the session of the Congress, and altogether it is expected several hundred forest conservationists will attend.

Wood Preserving Department

By E. A. STERLING

Ex-President American Wood Preservers' Association

AN investigation which may materially influence the best methods of computing creosote oil penetration has been made by Mr. Lowry Smith, superintendent of Tie Plants of the Northern Pacific Railroad. Mr. Smith has supplemented the recommendations and conclusions of the committee on wood preservation of the American Railway Engineering Association, to the effect that the unit measurement of pounds per cubic foot is not in all cases desirable, by an interesting table which shows an inconsistency from using this basis of measurement on timbers of different size. The data he has compiled all points towards the advisability of using superficial area instead of cubic contents as a measure of proper creosote retention in ties and structural timbers. Mr. Smith's table and studies will be given consideration by engineering bodies during the coming year, and will probably be the basis for definite recommendations.

THE Boston Elevated Railway Company, realizing the economic importance of treated ties, bridge timbers, etc.; the service of which is double and treble that of untreated wood, states through its president, Gen. Wm. A. Bancroft, that his company will build a small treating plant equipped for the Full-Cell or Rueping Process, to be located at their general yard, South Boston, Massachusetts.

This plant will have a cylinder eight feet in diameter and fifty feet long. It will be modern in every respect. Plans and specifications are now being drawn up by Mr. Grant B. Shipley, the well-known mechanical engineer of Pittsburgh. It is expected that the plant will soon be completed. Mr. E. W. Bright, Tie and Timber Agent, will have charge of its operation.

IN general it is not feasible, says Howard F. Weiss, Director of the Forest Products Laboratory at Madison, Wisconsin, for lumber companies and wholesalers to build and operate their own open-tank or pressure wood-preserving plants, but he believes that there are a few such concerns that might give this matter serious consideration.

Mr. Weiss made this statement at the annual conven-

tion of the Wisconsin Retail Lumber Dealers' Association at Milwaukee. He strongly recommended that retailers should carry in stock appreciable quantities of creosote oil, together with appropriate literature describing its proper use, and should sell such preservatives along with their lumber whenever it is needed. The preservative could then be applied by the consumer in much the same way that paint is now applied to lumber. It will find its particular usefulness in the treatment of timbers which can be kept dry only with considerable difficulty, such as sill timbers in ice houses, silos, etc. In places where decay is very prevalent, such as the foundation timbers in contact with the soil, it is Mr. Weiss' impression that it would be best to build the foundation of concrete or some other material which does not rot, and place the wood structure on top of such a foundation.

ACCORDING to statistics just compiled jointly by the American Wood Preservers' Association and the Forest Service at Washington, D. C., there was treated at 102 plants in the year 1915 a total of 141,858,963 cubic feet of timber, which compares with 159,582,639 cu. ft. by 94 plants in 1914; a decrease in quantity of about 11 per cent in 1915. Of the 1915 output, cross ties contributed 78.4 per cent of the total, construction timbers, 8.3 per cent, paving blocks, 5.4 per cent, piling 4.4 per cent, poles 1.7 per cent, and the balance consisted of cross arms, lumber, etc.

FORTY-SIX per cent of all the coal-tar creosote used in the timber-treating industry last year was imported from Germany and Great Britain. In 1914 the quantity was equivalent to 65 per cent, the falling off in 1915 suggesting a scarcity of foreign supplies as a result of the war.

THE new timber-treating plant at Brunswick, Georgia, which was built, but never operated, by the Brunswick Creosoting Company, has been purchased by the Georgia Creosoting Company, a subsidiary of the American Creosoting Company, of Louisville, Ky. The plant consists of two retorts, each 84 inches in diameter and 121 feet long.

Lumber Uses

BY WARREN B. BULLOCK

THE national movement among the colleges to teach the proper uses of lumber as part of the educational correspondence courses for the instruction of men in the business has been one of the fastest-spreading educational movements of the day. Started last fall by the University of Wisconsin, the course adopted there has been copied or is in preparation at nearly a score of universities. In each the basic idea of the course is that if lumber is properly used, there will be less waste of good material and the life of the nation's forests will thus be prolonged.

Harvard, however, has announced the installation of a more extended course, along the same lines, but a full school course instead of merely a correspondence course, excellent as those courses are proving to the man already in the business. The Harvard course is a two-years' course granting the degree of Master in Business Administration, and those taking the course in the department of forestry are given the degree of Master of Forestry.

The Harvard course is of importance not so much in itself, from the standpoint of the man whose life is devoted to forestry or the manufacture or sale of forest products, as it is indicative of the modern trend of opinion toward the lumber industry. The recognition that the future of the industry rests as much in the conservation of the tree after it is cut, and its proper use after conversion into lumber, as in the conservation of the original forests is evidence that a new view of the lumber industry is forcing its way into the mind of the public. This is evidenced by the introduction of the Harvard announcement when it says:

"With the changes that have taken place in recent years, the lumber business has come to offer an attractive field for trained men. In the earlier days of the industry, with timberland was abundant and relatively cheap, lumbering was largely a business of speculation in stumps, and the rise in the value of the timber often made up the bulk of the profit. Since the supply of timber has become greatly reduced, the business of handling it has become large and complicated, and the costs of labor, materials and other factors have gone up rapidly. To secure profit is more and more plainly a problem of management, of manufacture, and of distribution."

* * *

A NEW method of preventing sap stain in lumber is being developed at the Forests Products Laboratory at Madison, Wisconsin, in an effort to reduce the waste in lumber, and thus again make the lumberman more efficient in conserving his supply. It has been the practice of the lumbermen to dip their

product in a solution of sodium bicarbonate in an effort to overcome the blue-stain difficulty, checking the fungus growth which causes this stain. The laboratory has found that this stain can also be prevented by dipping the lumber in a solution of sodium fluoride. In addition to preventing the stain, this salt is found to render the surface of the wood antiseptic, thus destroying the spores of any fungi alighting upon it, and prevents the start of decay between the time that the lumber leaves the manufacturer and reaches the consumer.

"The appearance of the lumber," announces the laboratory, "is entirely unaffected by the sodium fluoride treatment, whereas it is claimed that a sodium bicarbonate solution sometimes causes yellow or brown discoloration of the surface. The laboratory is conducting further experiments to determine the exact strength of solution which it is necessary to use to produce the best results."

* * *

IT is probably outside the scope of this column to discuss the work being started in the middle west toward municipal forests, but the conservation of the forests already existent cannot be of any greater importance to the future than the development of these municipal forests, if this movement becomes in any way general.

* * *

THE use of artificial silk made directly from wood is increasing by leaps and bounds. Originally its principal use was in the manufacture of braids and trimmings, but recently the manufacture of hose from artificial silk has become an industry of vast importance. Other uses for artificial silk are woven goods of all kinds, linings, tapestries, etc., neckties, ribbons, sweater coats, etc. About five and one-half million pounds of artificial silk are used annually in the United States. There are several methods of manufacture, but that from wood pulp is usually made by treating the wood pulp with caustic lye after which it is dissolved in carbon bisulphide. This is then diluted with more caustic lye to form a viscose which is allowed to age for some time. It is then forced through dies to form threads which are hardened by a treatment with sulphuric acid, ammonium sulphate, and sodium borate, or formic acid. After washing and drying, the silk is ready for use. The Forest Products Laboratory, Madison, Wisconsin, is investigating the artificial silk problem as a possibility for utilizing wood waste and has on hand a variety of articles made from this material.

Editorial

NEW NATIONAL PARKS AND THEIR ADMINISTRATION

SINCE the outbreak of the war, the tide of tourist travel, diverted from European objectives, has sought out every nook and corner of our own land, and the numbers of visitors to our great National Parks, the Yellowstone, Yosemite and Glacier, has more than doubled. As a result, a wide public interest has arisen in the entire subject of national parks, which has focused in numerous definite projects, eagerly championed by various localities, which would be benefited by their establishment. The existing National Parks, with their great number of visitors, and extensive advertising and support by railroads, not only bring in considerable local revenue but aid in securing large congressional appropriations for good roads within and to the parks.

New National Parks are seldom established by the purchase of private lands. Even the groves of Giant Sequoias were obtained by the Government largely by exchange for other timber. In nearly every instance, these new proposals involve the reservation of property now owned by the nation. With few exceptions the areas desired for their scenic beauty now lie within National Forests, and are under the administration of the Forest Service. Since every acre of National Forest land is open to the free use of the public for recreation, it is evident that there must exist some specific reason other than the right to enter and enjoy the beauties of nature, for setting aside as National Parks, lands now administered as National Forests!

This reason lies in the fact that the existing National Parks are reserved *wholly for recreation*, and that *commercial uses such as grazing by domestic animals, lumbering, mining, agriculture and power development are rigidly excluded*. There exists a deep-rooted sentiment in the minds of the public who seek nature for itself that such commercial uses are a desecration. The lumberman's ax must be forever barred—the older and more decrepit are the veteran trees, the greater the charm of their presence. Overgrazing by wild game as seen in the immense herds of elk in the Yellowstone Park, which have to be fed with hay in the winter to escape starvation, is wholly in harmony with the true objects of parks as such—to preserve nature in all its wildness—but the presence of sheep and cattle, which destroy the same wild flowers and eat the same browse as the elk, is wholly incompatible with these objects.

These convictions and prejudices are so strongly rooted that the wisdom of administering areas designated as parks under a separate organization is apparent. Those areas like the Yellowstone upon which the public has placed a high sentimental value must be free from all suspicion of commercial spoliation.

But how many *large areas* exist in the West whose scenic features are so strikingly unique and beautiful as to demand their unconditional reservation as parks? The setting aside of several hundred thousand acres, upon which every resource must lie idle except the exploitation of the tourist, will in most localities result in greater loss than gain to the local community. The timber is needed for local industries, and mines would lie idle for lack of it. Sheep and cattle which formerly supported hundreds of small settlers would be expelled from these national lands. Waterpower development would be prevented. Under these circumstances, such reservations would be fiercely opposed by the very communities which might benefit by the tourist.

Actually confronted by this dilemma, our statesmen representing these localities have resorted to the simple device of trying to eat the cake and have it too. Numerous bills, among which may be mentioned those to create the National Park of the Cliff Cities, New Mexico, the Mount Baker National Park, Washington, the Sawtooth National Park, Idaho, the Cabinet National Park, Montana, the Sequoia National Park, California, and others, deliberately grant the power to the national government to conduct lumbering operations, grant rights of way, relinquish lands for agriculture, permit mining and grazing, in exactly the same manner, on these proposed park areas, as is now permitted on these same areas under their present classification as national forests. The vital distinction of "park" areas is to be deliberately marred to silence local opposition, and to secure the advantages of a "national park," including additional federal appropriations for roads, with none of its restrictions or drawbacks.

Aside from the dishonesty and deception inherent in such proposals, there is the additional serious defect that every bill of this kind proposes to remove the suggested areas from the present jurisdiction of the National Forest Service and transfer them bodily to the Department of the Interior. As long as the existing National Parks are few, large and segregated from National Forests, as at present, the waste and friction inherent in having two parallel administrations of national lands is not so apparent. But should this movement result in the creation of numerous smaller areas, upon which all sorts of commercial activities are legally sanctioned—the proper administration of the resultant lumbering, grazing and other uses would demand a complete duplication—in the Interior Department—of the organization of the Forest Service over contiguous areas. No argument can be found for such a wasteful plan.

The proper solution of this problem demands attention. The American public will not permit the administration of the Forest Service to be rent asunder by wholesale transfers of forest lands to the Interior Department under the guise of creating National Parks which are parks in name only. *It is the fixed policy of the Forest Service to protect scenic features, lake shores and camp sites from spoliation* and to develop to the fullest extent the use of the forests for recreation, which is recognized as the most valuable of all uses for such areas as are endowed with especial features. Over most of the 160,000,000 acres of National Forest land this problem is

being solved to the perfect satisfaction of all—*except for the one element of advertising.*

There are probably other areas beside the existing National Parks, whose *exclusive use* for park purposes is justified by peculiar natural features. These will in time be set aside as national parks. But to secure the harmonious development of the entire park policy, there should be created a Bureau in the Department of Agriculture, of equal rank with the Forest Service, which should assume the care and management of these distinctly park areas. By this means, perfect harmony and cooperation may best be secured and the legitimate demands of every locality be determined and satisfied.

STATE FORESTRY IN MARYLAND

FOR many years, since forestry became a State and National issue in this country, the attempt has been made, repeatedly and in many sections, to have Boards of Forestry and the Forest Departments of various States consolidated with other interests. We could almost term it *absorption* instead of consolidation, for while forestry may continue to labor along with a certain degree of success under or with fish, game, agricultural or other fields of work, it never is the vital subject which may be expected when it is independently conducted.

It is most unfortunate that efforts made from one or another motive, should ever be able to jeopardize work satisfactorily carried on for years, work planned and conducted by an out-and-out Forestry Service on a substantial footing of its own. In Maryland, this year, a strong attempt was made to have the status of the present Board of Forestry, now in its eleventh year, absorbed by a new, untried Board of Agriculture which had a few arguments to favor it, and a great deal of experienced professional opinion dead against it.

Testimony of recognized experts in the profession was

brought to bear upon this question before the legislative bodies of the State, and the showing made proved so conclusively that this absorption, if tolerated, could only be a step in the wrong direction, that the move was at once dropped by those who had been backing it. Next a cut in appropriations was considered, until it was shown that, even with the present general appropriation, funds were insufficient to adequately carry on the field of work open to the Board. Especially was it desired to secure funds for fire protection, and the fact that the General Assembly finally did vote \$5,000 to this latter purpose, in addition to a fair general appropriation measure, and a smaller one for the care and improvement of a newly-acquired State Reserve, is regarded as reasonably satisfactory in a year when "economy and efficiency" were made to figure in every bill and appropriation that was passed.

As for the proposed absorption, the prompt disposal of it only adds to the weight of experienced and unbiased opinion that forestry is sufficiently large, and admittedly vital enough, to have a department by itself.

THE SPIRIT OF COOPERATION

READERS of AMERICAN FORESTRY will be interested in knowing more of that spirit of true cooperation which is becoming so manifest in the National Forests of the West, as evidenced by the substance of a letter to District Forester Riley at Denver from Supervisor Langworthy of the Uncompahgre Forest in Colorado. The letter, date May 6, reads as follows:

"Upon a recent trip to the Cimarron district I was told of the assistance rendered last summer by Mrs. E. A. Duling on the Jackson fire which I consider worthy of mention.

"The Jackson fire was probably the most difficult to control of any which has occurred on this forest. It burned for eight days, fifteen men being employed to extinguish it. Ridgeway, the point where supplies were purchased, is 21½ miles distant—eight miles of wagon road, the balance trail over Owl Creek Pass. The

rangers on this forest carry quite a stock of supplies at their stations, but so many men at the Jackson ranger station soon caused a scarcity of some of the staples, and the ranger 'phoned to the Duling ranch on Owl Creek asking that someone be sent for food. Mrs. Duling was alone at the time and instead of waiting for the men folks to return and go to Ridgeway, which would have caused a day's delay, she got together what she had at the ranch, borrowed the balance from neighbors, caught up horses, packed them in approved style, and rode with the much needed supplies to the top of Owl Creek Pass—a stiff 6-mile climb—where she was met at 5 p. m. by a ranger.

"Mrs. Duling is a typical Colorado girl—a good rider, a good shot, and knows how to pack, as evidenced by her help at the Jackson fire. She is a fine type of American womanhood, and has been a great help on many other occasions."

Canadian Department

BY ELLWOOD WILSON,

Secretary, Canadian Society of Forest Engineers

The Riordan Paper Company of Montreal have decided to commence planting operations on their limits, and their forester, Mr. Volkmar, has been investigating the plantations and nursery methods of the Laurentide Company of Grand' Mere. It is interesting to note how the progressive paper companies are taking up the planting idea and there is no question but that such a policy will prove highly productive in the long run.

The Canada Paper Company, Ltd., of Windsor Mills, Quebec, intends to cut fire lines and clean up the debris on their holdings this spring. This company is especially fortunate in having freehold lands within easy reach of their mills and they are in a position to get the greatest possible value out of forestry methods. It is the intention of this company also to plant up their waste lands and lands not fully stocked.

Mr. Piché, Chief Forester of Quebec, recently made a visit to Grand' Mere, and while there mentioned the fact that settlers in the Abitibi region were having difficulty in selling their pulp wood. Mr. Piche recently purchased eighteen Jensen tree planters for use in the government planting operations.

Mr. P. Z. Caverhill, Forester for the Province of New Brunswick, recently made a visit to Grand' Mere to discuss methods and costs of forestry surveys with Mr. Wilson. Mr. Caverhill has already begun his survey and inventory of the Provincial Crown lands.

The Dominion government has decided to exclude all foreign lumber in connection with the public work carried on by it. At the present time the Parliament buildings at Ottawa are being rebuilt, but only Canadian lumber will go into the new structure. A short time ago the Canadian Pacific Railway issued a similar order. Both movements have been made for the purpose of encouraging the industry in the Dominion. Last year, although the country was at war, Canada imported 95,000,000 feet of southern pine, valued at over three million dollars. These figures were much below the previous year, but show something of the heavy importations of pine from the United States. Practically all our hardwood has been imported from

south of the forty-ninth parallel, but according to the new arrangement, only Canadian hardwoods will be utilized in the public works of the Dominion. At the present time a number of important works are going on in addition to the rebuilding of the Parliament buildings, harbor improvements are being made at Montreal, Quebec, Toronto, and in connection with the Hudson Bay terminals. In these works Douglas fir will take the place of Southern pine, formerly used. For the interior decoration of cars and the wood used in their manufacture, Canadian woods will hereafter be used. It is said that the movement will spread and that big implement manufacturers will take it up.

Mr. J. R. Booth, the veteran lumberman of Ottawa and Hull, has just celebrated his ninetieth birthday. Despite the fact that he is now twenty years past the three score years and ten allotted by the Psalmist, Mr. Booth continues to take a very active interest in all his companies' activities, even to helping around the mills.

Messrs. J. O. Mason and J. H. Cunningham, superintendent of manufacturing and statistician of the Laurentide Company, have gone to Kalamazoo to attend the meetings of the Taylor Society and the Technical Section of the American Pulp and Paper Association.

The report of the British Columbia Forest Branch for 1915 is just out and is a very interesting pamphlet. The reports of its activities in trying to increase the timber trade of the Province are good reading and the successes of both its foreign and domestic trade commissioners have been marked. The bulletins issued advertising its woods and showing the best ways to utilize them are well gotten up and thoroughly practical and the illustrations add much to their value.

Mr. Austin F. Hawes, State Forester of Vermont, was on a visit to Montreal recently.

The Laurentide Company, Ltd., of Grand' Mere, Quebec, has a large tract of land, at present about twelve hundred acres, devoted to planting and experimental cutting operations. Different systems of cutting are being tried out and experiments

in natural regeneration also. In all these thinnings or cuttings the slash is piled and burnt. Plots have also been marked off and all the trees numbered and a band painted about them at breast height, and each year the diameter growth is measured. Plantations have been made not only in the open but under different kinds of stands and on different soils. Experiments in draining swamps are also to be undertaken and a system of good dirt roads and fire lines is also kept up.

The Canadian Forestry Association is enlisting the help of the boards of trade of the different Ontario towns and cities in its fight for better fire protection and administration of the forest lands of that province. The association has gained one hundred and forty new members since February and is in better condition than ever.

The Hon. Jules Allard, Minister of Lands and Forests in Quebec, has been made a member of the Legislative Council of the Province.

Mr. Ellwood Wilson recently made a trip to an aeroplane factory to examine aeroplanes and see if they would be practical for forest fire ranging work. There is no doubt that for finding fires they are entirely practical, but they are so difficult to launch and to land with at present that they are hardly practical as yet. A suggestion made by someone that clearings of seven or eight acres in extent be made at convenient places in the forest for landing and starting is out of the question, as such clearings would be too expensive to make and keep clear, and the great value of the aeroplane would be its ability to travel fast, see over a large area at once, and to alight near a fire and extinguish it. This latter is the most important and the most difficult thing for an aeroplane to do. Of course, a flying machine travels so fast that a fire could be reported without delay, but by the time a crew was organized and transported some fifty or one hundred miles the fire would have gained a big start. It is certain, however, that these disadvantages will soon be overcome and the necessity for lookout towers and slow-moving rangers will be done away with.

Messrs. D. A. Macdonald and C. H. Morse, of the Dominion Forest Service, have been elected associate members of the Canadian Society of Forest Engineers.

Mr. E. H. Roberts, acting district inspector for Saskatchewan, of the Dominion Forest Service, reports that the fire season is beginning later than last year and the outlook is more favorable due to considerable rain and snow flurries every few days.

Some Words of Praise

"The new magazine is fine. I find it a great help in Botany and other science teaching in the high school. We are getting acquainted with the important timber trees of the United States.

A. E. WARNER,
Allegan, Michigan.

"No forest officer should be without your magazine. I like it very much indeed."

E. W. SEARCY,
Elsinore, California.

"I think AMERICAN FORESTRY is very attractive—the illustrations are wonderful."

MISS CORA H. CLARKE,
Boston, Massachusetts.

"I want to take this occasion to congratulate you on the improvement in the organ of our association, and also upon the very interesting and readable material which it has contained."

R. P. BASS,
*Ex-Governor of New Hampshire,
Peterborough, New Hampshire.*

"AMERICAN FORESTRY MAGAZINE is excellent and deserves success and wide distribution."

D. L. PICKMAN,
*53 State Street,
Boston, Mass.*

"We like AMERICAN FORESTRY. It is educational in the line of forestry. Your effort in conserving the forests for the use of present and future generations is a noble one, and should have the help and support of every one interested in the welfare and prosperity of mankind."

RICHARD BENNETT,
Bennett, Wisconsin.

"I want to compliment you on your very beautiful issue of AMERICAN FORESTRY. It is certainly very pleasing in every particular."

E. W. MEEKER,
*Mgr. Editor Hardwood Record,
Chicago, Ill.*

"I wish to congratulate you and everyone else who may have had a hand in the recent change in the get-up of the magazine. It is excellent. At the last meeting of the Botanical Society of Western Pennsylvania a couple of our members took up the larger part of the time in reviewing and commenting upon the August and September numbers—and it would not at all surprise me if you get a few subscriptions as a result of the favorable comments."

DR. O. E. JENNINGS,
*Editor, The Bryologist,
Carnegie Museum, Pittsburgh, Pa.*

"I have very great pleasure indeed in reading your journal, both the literature and illustrations of which are most excellent."

J. A. DUTHIE,
Aberdeen, Scotland.

"AMERICAN FORESTRY is a thorough treat to me every month and something which I look forward to for weeks before it is due."

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"AMERICAN FORESTRY arrived this morning, and I wish to congratulate you most heartily on its splendid appearance. The cover is very attractive and excellently printed, and the stock used throughout the whole job is certainly of the finest. The cuts are well etched and show up details magnificently, and altogether I think you certainly ought to be highly congratulated on the typography and general appearance of the issue."

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"I want to congratulate you upon the appearance of AMERICAN FORESTRY in the new size. The illustrations are beautiful and the general character of the magazine is so high class in every respect that I feel you have good cause to be proud of it."

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Lancaster, Pa.

"I had occasion to visit some friends of mine in Rochester a few days ago and found the AMERICAN FORESTRY lying on the center table. I commented upon its presence and found both of the men of the household extremely enthusiastic about it. The father, a man of 83, told me in its new form it was one of the most interesting and up-to-date magazines he knew of. I am frank to admit I have also become converted and like your new form, commenting especially upon the columns or page for children."

F. F. MOON,
Syracuse, N. Y.

"The magazine published by the Association is a beauty, is very interesting, and I have passed it around to my friends in all parts of the State, urging attention and interest in the work. I congratulate you on your success and hope that the plans of the helpful, efficient men that are interested in the Association will work to the advantage of the organization and of the whole country."

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"I consider every issue of AMERICAN FORESTRY a treat."

H. L. CHURCHILL,
Forester, Glenn Falls, N. Y.

"While I may be somewhat late in expressing my thorough appreciation of the new magazine, nevertheless, I trust it is not too late now, and not only are the articles in it of interest, but especially did the children's department catch my eye."

R. S. MADDOX,
Forester, Nashville, Tenn.

"I am a member of the Association, and I cannot refrain from expressing my admiration for AMERICAN FORESTRY in its new form."

E. W. BRIGHT,
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"In looking over the recent numbers of AMERICAN FORESTRY I am much impressed with the remarkable change and improvement both in the make-up and matter of this publication."

FREDERICK W. KELSEY,
150 Broadway, New York City.

A Beautiful Calendar.

James D. Lacey & Company sent out early this year a calendar on the preparation of which they expended the best of taste and not a little money. It consists of a large original photograph about ten by nineteen inches, of a beautiful group of Sitka Spruce trees. This is handsomely mounted and tied with a satin ribbon, and bears a calendar pad of practical size at the bottom. This calendar has had a rather wide distribution and its beauty has brought forth many an expression of praise for it, the firm receiving compliments upon the beauty of the production from practically every one who became a fortunate possessor of one of the calendars.

Wyman's School of the Woods

The forestry students of Wyman's School of the Woods, Munising, Michigan, have completed the winter term as conducted in Munising, and are now comfortably located in their summer home on Perch Lake, about four miles from the city. The field work during the summer term will include surveying, topographic mapping and estimating, besides dendrology, ornithology, forest botany and woodcraft. The great activities in woods operations in the immediate vicinity will give the men the best of opportunity to study logging and forestry work as it is actually carried on by the lumber companies in the Upper Peninsula of Michigan. Some of the students have built their own log cabins and will do their own cooking, while the others, living in tents, will eat at the regular camp table. The work will be carried under the direction of Thomas B. Wyman and R. R. Fenska.

Use of Dynamite in Rubber Cultivation

The use of dynamite in the cultivation of rubber in the Federated Malay States is discussed in an article in the Agricultural Bulletin of these states. After describing the operations in detail it says:

That dynamite is unequalled for breaking up hardpan or layers of impervious subsoil, which not only prevents the roots from going down to the subsoil but interfere with the drainage.

It is most effective on heavy clay and hard laterite soils and least effective on light or loose soils, which offer no resistance to the explosion.

That it might be profitably employed in holding previous planting, especially in heavy soils, half a charge of dynamite being sufficient for this purpose.

It may be successfully used in breaking up logs and tree stumps infected with termites in rubber clearings.

That the value of dynamite for cultivation is not doubted but the high cost of the explosive prevents its more general use.

University of Georgia

The Forest Service is conducting a cooperative woodlot study with the Forest School, University of Georgia, the object being to ascertain the methods of marketing the farm woodlot products and to suggest improvements. The data will be placed before the farmers of the State in a publication of the university.

The Forest Nursery is in a flourishing condition. Some 30,000 seedlings, representing about 50 species, were set out this spring. The nursery, as a project, provides for the sale of surplus nursery stock at cost to residents of the State. Many of the colleges, academies and high schools of the State plan to share in the distribution of this surplus stock.

Forest Camp has been permanently established on the Georgia tract, in northern Georgia. As soon as possible buildings will be erected and arrangements made for permanent field equipment. Both freshmen and sophomore forestry students are required to complete summer terms of nine weeks in Forest Camp. Work is also offered for those mature men who desire practical instruction in forest mensuration and to those men and women who desire a knowledge of nature. The Ranger School has a duration of eight weeks, the Nature Study School of six weeks.

W. G. M. Stone Dead

William G. M. Stone, of Colorado, died May 8, in Longmont, Colorado, at the age of 84 years. During the last thirteen years Mr. Stone was president of the Colorado State Forestry Association, resigning because of infirmities less than a month before his death, which was hastened by his

activities in preparing for and attending the annual meeting of the association, held in Denver late in April. Mr. Stone and the organization over which he presided exerted a great influence in Colorado, and probably throughout the entire West, during the critical period when forestry was first introduced as a national policy in the newly established National Forests. His untiring devotion to the cause of conservation, his patience and calm, good sense, together with the great respect accorded to him, were no small factors in overcoming the well-organized, determined opposition to National Forests in the West a few years ago. It is given to very few to accomplish as much as Mr. Stone has in any matter of great public benefit. His influence will be felt for many years, and appreciation of his services will increase.

Acquire Large Property

The properties of the L. E. White Lumber Company at Greenwood and Point Arena, Mendocino County, California, have been sold to the C. A. Goodyear and James D. Lacey interests of Chicago, and James A. Mackenzie of San Francisco. The timber lands, town site, mills and other assets are valued at upwards of \$3,500,000. The transaction involves one of the oldest and largest operating redwood properties in the State of California and identifies with California lumber production, one of the oldest, most successful and most widely known groups of lumbermen in the United States. The new organization will be known as the Goodyear Redwood Company.

The L. E. White Lumber Company founded thirty-five years ago has grown steadily until today it includes over 85,000 acres of timber, grazing and agricultural lands; cattle, mills, town, and landings at Greenwood and Point Arena and a line of lumber carrying vessels. For the past fifteen years the enterprise has been under the ownership and direction of F. C. Drew of San Francisco.

The officers of the Goodyear Redwood Company are C. A. Goodyear, Pasadena, Cal., and of the C. A. Goodyear Lumber Company of Chicago and Tomah, Wis., president. The Goodyear family is also prominently identified with the Great Southern Lumber Company at Bogalusa, La., which operates the largest sawmills in the world. Extensive holdings of Douglas fir in Clallam County, Washington, are owned and being developed by the Goodyear Logging Company. In California they have some 25,000 acres of White and Sugar pine in Glenn County. Lamont Rowlands, Chicago, Ill., of the C. A. Goodyear Lumber Company, vice-president. James A. Mackenzie, San Francisco, Cal., vice-president and treasurer. W. G. Collins, formerly assistant manager of the Portland office of James D. Lacey & Company, secretary and general manager. The new

company will be represented by J. A. Mackenzie at San Francisco; and W. G. Collins at the Greenwood and Point Arena plants.

James D. Lacey, founder of the firm that bears his name, and who for more than thirty-five years has been prominent as a successful operator in standing timber, and as a capitalist with broad and varied interests, is chairman of the board of directors. Mr. Lacey was a pioneer in the Southern Cypress industry and with the depleting of the cypress forests his interest naturally turns to redwood. The Goodyear Redwood Company has entered into an arrangement with the Union Lumber Company of San Francisco and Ft. Bragg, to handle locally the product of the mills at Greenwood; while the Goodyear Lumber Company, through its Eastern and Middle-Western affiliations will vigorously exploit California Redwood in those markets.

After his long and prominent career as president and manager of the L. E. White Lumber Company, and his active interest in movements for the extension and betterment of the California Redwood industry, Mr. Drew's retirement is a matter of regret to his former lumbering associates.

BOOK REVIEWS

The Conquest of America. By Cleveland Moffett. \$1.50. George A. Doran Company, New York.

A book graphically treating of the story of an imaginary invasion of America, telling how unprepared the country was to repel invaders and how after a tremendous struggle the victory was won.

The Cruise of the Tomas Barrera. By John Henderson. Putnam Company, New York.

The author, a Washingtonian, tells in narrative form of a scientific expedition to Western Cuba and the Colorado Reefs, with observations on the geology, fauna, and flora of the region. He was a member of a party of scientists of the Smithsonian Institute. The book is profusely illustrated.

"Field Book of Western Wild Flowers." By Margaret Armstrong, in collaboration with J. J. Thornber, A.M. Putnam's, New York.

In this little book a very large number of the commoner wild flowers growing in the United States, west of the Rocky Mountains, are pictured and described. It is the first attempt to supply a popular field book for the whole West. The field is vast, including within its limits all sorts of climate and soil, producing thousands of flowers in variety and wonderful in beauty. This book is intended primarily for the general public. Almost all technical botanical terms have, therefore, been translated into ordinary English.

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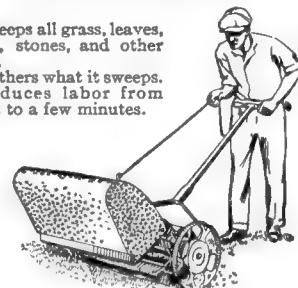
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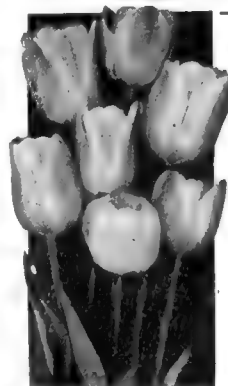
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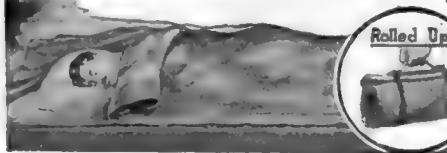
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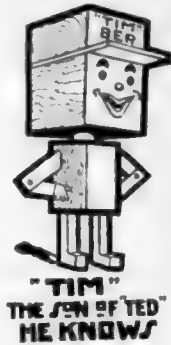
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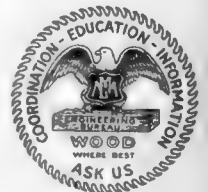
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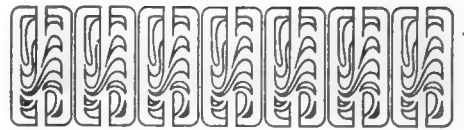
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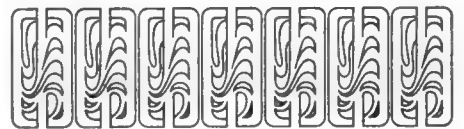


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Vol. 22

JULY, 1916

No. 271



JUL 26 1916

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The Magazine of the American Forestry Association

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American Forestry

VOL. XXII

JULY, 1916

No. 271

The White Pine

Identification and Characteristics

BY SAMUEL B. DETWILER

THE white pine is the monarch of the eastern forests, "in lordly right predominant o'er all." No other tree has been so important to the commercial development of America, and in beauty, stateliness, and individuality of form it is rivalled but not surpassed. When the Pilgrims landed on the cold and cheerless Plymouth shore, the pine was the only green thing to greet them, and it became their emblem on the historic "pine tree shilling" and other coinage. As the forests retreated before the axe, southeastern Maine became renowned for its "pumpkin pine" and Maine is still called in recognition of the white pine growth the Pine Tree State.

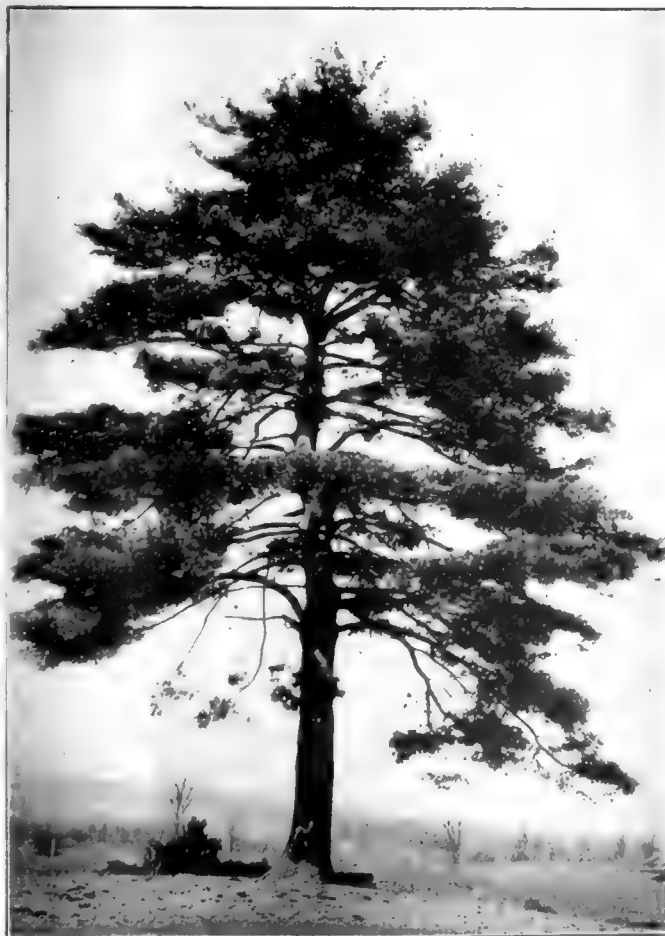
In the song and story of the lumberjack and river driver, white pine holds the most honored place. The history of the lumbering of white pine until 1890 is also practically the history of the lumber industry in America up to that time. The first house built in America of which there is authentic record, was constructed of white pine. In 1890 white pine lumber formed nearly one-third of the yearly output of lumber; ten years later more than one-fifth of the lumber used in the United States was still white pine, but in recent years it has constituted less than one-tenth of the annual cut. Although most of the magnificent virgin white pines have given their lives that we might thrive, an abundant second growth has taken their place wherever forest fires have been controlled, and with proper

care this will provide a continuous though diminished supply of this most typical American wood.

White pine is native from Newfoundland and the northern shore of the Gulf of St. Lawrence to southern Manitoba. It ranges southward through the region of the Great Lakes to northern Illinois, northern and eastern Ohio, Pennsylvania, and along the Allegheny Mountains to northern Georgia. The most perfect development of white pine was in New England, New York and Pennsylvania. When this supply was exhausted the lumberman moved on to Michigan, Wisconsin and Minnesota. At the present time, Minnesota produces more white pine

lumber than any other state, Minnesota and Wisconsin together furnishing about one-half of the annual cut.

White pine grows straight as the masts for which it has so well served, sometimes to a height of more than 200 feet. Thousands of acres of blackened stumps, many of them 4 to 5 feet across their tops, are all that remain of once splendid white pines. One early writer states that in 1736 in Dunstable, N. H., a white pine tree was cut which had a diameter of 7 feet 8 inches. Another New Hampshire tree felled 150 years ago measured 274 feet in height. One account mentions the white pines found in New England as being "frequently 6 feet in diameter and 250 feet in height." Most of the trees of this species that are cut by the lumberman of today are less than 3 feet in diameter and 125



SECOND GROWTH WHITE PINE

White pine is undoubtedly the most popular of all the forest trees for planting. Millions of White pine seedlings are now growing at nurseries and millions will be planted in the future.

feet in height, but some large ones are still found.

Free-growing white pine trees have live branches to the ground and the trunk is short, tapers rapidly and not infrequently it divides into two or more parts. In the forest the stems have little taper and are without side branches for 25 to 75 feet above the ground. The branches spread horizontally and in old age the tops are irregular and picturesquely flattened and tufted with foliage. This feature of the tree is so characteristic that an old tree may be recognized by its general appearance almost as far as it can be seen. Thoreau greatly admired the white pines and wrote: "Their flattened boughs rest stratum on stratum like a cloud, a green mackerel sky,—all branches distinct like the frond of a fern." The bark on branches and young trunks is thin, smooth and greenish, but soon turns light brown and is later dark and scaly. Large trunks have thick, dark gray bark, with broad scaly ridges separated by shallow furrows.

Like all pines, the leaves are needle-like and borne in clusters. The white pine is easily told from other native pines in the region in which it grows because its needles are always in groups of five. Young leaves are pale green and the clusters are surrounded at the base by a paper-like sheath. When the leaves mature this sheath falls away and the

leaves in each group stand apart giving to the foliage a tasseled, feathery appearance which is more pronounced because the needles are so soft and flexible. The full grown leaves are from $2\frac{1}{2}$ to 5 inches long, bluish green in color, with a beautiful, silvery sheen on one surface. When the leaves are stirred by a breeze, the light color of the leaves is very noticeable, and makes it apparent why this tree bears the scientific name of *Pinus Strobus*. The leaves are tri-

angular in cross section and the edges are notched with tiny saw teeth. When the five needles in a cluster are pressed together, it will be seen that the edges join to form a cylinder. The leaves die and fall in September of their second season or in June of their third year.

In May, when the new growth begins, the flowers of the white pine appear. The pollen-producing flowers are yellowish, egg-shaped bodies about one-third of an inch long, clustered at the base of the new growth. When ripe, they shed the bright yellow pollen very abundantly and it is carried long distances by the wind. Each minute pollen grain is provided with two air sacs that convert it into a microscopic balloon. The seed producing flowers are borne singly or several together on the upper branches of the trees. At first they are slender, upright, rose-colored cones about one-fourth of an



WHITE PINE

From "Pennsylvania Trees"

1. Branch with needles and terminal cluster of buds
2. A cluster of five needles, one-half life size
3. Tip of White pine needle, enlarged
4. Branch with staminate flowers
5. Branch with (a) pistillate flowers on new growth and (b) one-year-old cone on last year's growth
6. Branch with open and closed cone
7. Lower side of a cone scale
8. Upper side of a cone scale with two winged seeds
9. A winged seed, one-half life size
10. A seed, natural size
11. Section of seed with embryo, natural size
12. A seedling one-half life size

inch long. By autumn they are about an inch long, with a purplish color. The next spring the cones turn green and their increasing weight causes them to hang downward, incurving toward the branch. By July of the second season the cones are fully grown, usually from three to six inches long, sometimes ten inches. In addition to being slender the ripened cone is known by its light brown color and its smooth rounded scales, entirely free from spines at their tips. Except for a few sterile scales at the base and tip of the cone, each scale bears two brown, winged seeds. Most of the seeds are scattered during September and October as the cones open, but all through the winter old Boreas continues to whirl them over the snow. Many of the seeds are carried to a distance equal to twice the height of the mother tree, and some travel considerably farther. The cones drop from the tree after they have shed their seed. Some cones fall before this is accomplished,

arate seeds. In a good seed year, a single large tree will yield from two to five or more bushels of cones. The seeds germinate best in mineral soil and ordinarily from 10 to 20 per cent fail to start growth. If the accumulation of needles under the seed trees is very great the young seedlings are apt to die before the roots reach the mineral soil from which they obtain their nourishment.



THE AREA OF WHITE PINE GROWTH



WHITE PINE GROWN IN THE OPEN

This is a typical White pine growing at Raquette Lake in the Adirondack Mountains. The photograph is from a collection owned by the American Museum of Natural History and was taken by Ernest F. Keller.

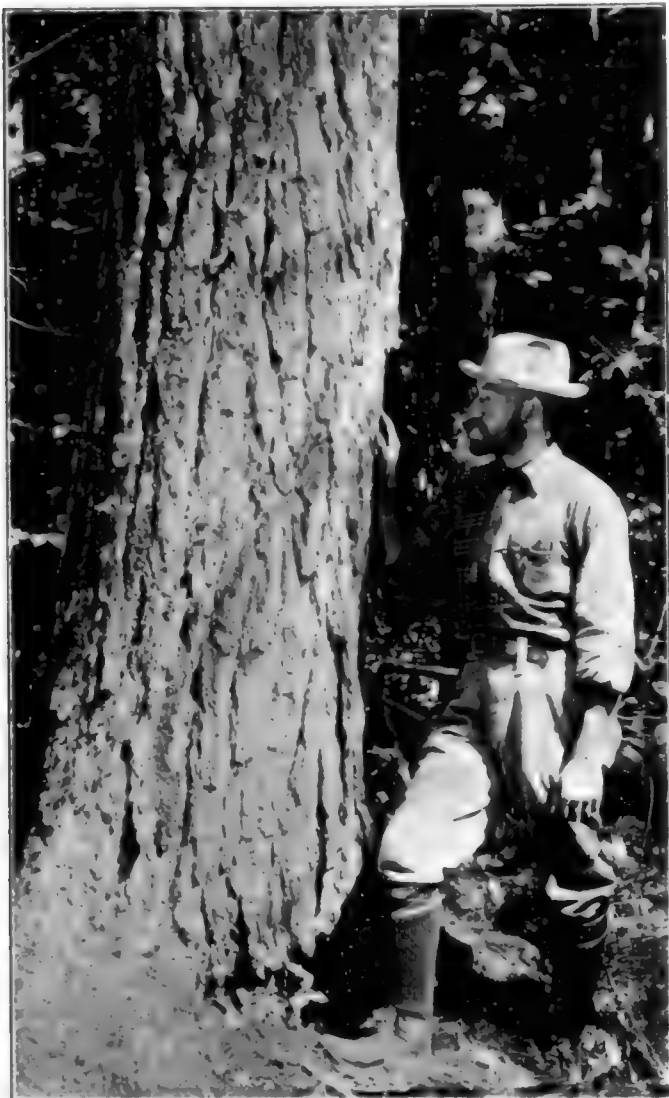
Late in the spring the tiny seedlings may be seen pushing upward the old seed shell that binds the ends of the ten baby leaves into a spindle-shaped cluster. The tips of these leaves remain imbedded in the food stored up in the seed shell until all of the nourishment is absorbed. Then the shell is thrown off and the young leaves proudly spread out into a tiny ten-pointed star, at the center of which is the bud which unfolds year after year and carries the stem upward, straight as an arrow. Surrounding this central bud are other buds, usually five in number, from which five branches start when the growth of each year begins. For this reason, each successive year's progress is plainly marked by a whorl of branches, and since the main stem of the tree between the nodes is generally free from branches, it is very easy to determine how many years a young pine has required for its growth by simply counting the number of whorls. White pine seedlings that come up in dense shade under older trees will live for a number of years, but without making much growth. If the over-shadowing trees are suddenly removed and the seedlings exposed to full, intense sunlight, most of them die before they can become accustomed to the new conditions. If the larger trees are removed so as to gradually admit the air and sunlight, the young seedlings readily adapt themselves to the change and eventually grow into vigorous trees.

for White pine seeds are greatly relished by the squirrels for winter food, and early in September they begin to cut large quantities of the cones from the trees and bury them in big or little piles, for future use. Although some cones are produced every year, it is usual for heavy crops to be borne every three to five years.

Gathering White pine seed for planting or for sowing in nursery beds is an established business. A bushel measure will hold about 1,000 cones and yield about a pound of clean seed containing more than 30,000 sep-

The bark of a young White pine is so thin and tender that even a very light fire produces sufficient heat to kill it. One of the greatest losses by forest fires is caused by the death of these little trees which so many do not see, or at least believe to be only valueless "brush." True, little pinelets struggle with each other and with other kinds of trees for moisture from the soil and for the space

to spread their ever-widening crowns, and many die in the battle. But those that survive are the finest and best specimens of their kind, and this is nature's way of developing the straight, clean stems that produce the even-grained, knotless lumber that has given white pine fame throughout the civilized world.



BARK OF THE WHITE PINE

On old trees the bark is thick, dark, gray and divided by long, and slow fissures into broad longitudinal ridges; on young trees it is thin, smooth and greenish-brown, later growing scaly and darker.

It is not unlikely that some of the white pines still standing in our forest were saplings when Columbus discovered America. There is a record of a tree in Pennsylvania, 42 inches in diameter at 4½ feet above the ground, with a total height of 155 feet, that was 351 years old and scaled 3,335 feet. Several fair sized areas of virgin White pine forest are still to be found in Warren and Forest Counties, Pennsylvania. Those who admire the White pine will find it well worth while to make a pilgrimage to these tracts just for the pleasure of standing on the soft brown carpet of resin-scented pine tags and listening to the sound of the sea as the wind sways the tops of "the murmuring pines and the hemlocks," nearly 200 feet above ground.

The wood of White pine is resinous, light in weight, compact, straight-grained and even of texture, soft and easily worked, but only moderately strong. It does not warp, shrink or check, and has been used for practically every purpose for which wood is adapted. Large trees have a thin ring of sapwood. When first cut there is little difference in color between heart and sap, but the crystal-clear drops of resin that ooze from the sapwood as soon as it is cut plainly distinguish it from heartwood. After being exposed to the air the heartwood changes to a light reddish-brown color. The great usefulness of



INTERIOR VIEW OF PLANTATION

Showing the regularity of planting and growth in trees which are now fifty-five years old. It is estimated that the net profit of this white pine if cut now would be at the rate of \$140.25 an acre.

White pine is due largely to the ease with which the woodworker can fit it to his requirements, its almost complete freedom from shrinking or swelling, its strength in proportion to its weight, and its durability when exposed to the weather. It is not especially durable in contact with the soil.

White pine prefers fertile, well-drained soil, but grows satisfactorily in all but the driest sands or very swampy lands. Its most common associate is the hemlock, but it also grows with other conifers and with the northern hardwoods. Forests composed almost entirely of white pine occur under natural conditions and it thrives when planted alone or mixed with other species. It is the most important tree for reforestation waste lands in the north-eastern United States, and of late years thousands of acres have been planted with it, mostly by private owners. Its rate of growth is rapid and evenly maintained. In 35 years White pine trees in a fully stocked plantation will reach forty to fifty feet in height and yield from 10,000 feet to 30,000 feet B. M., depending on conditions of growth and the closeness with which the trees can be utilized. A White pine plantation in Connecticut, 31 years after planting, had an estimated yield of 15,000 feet B. M. per acre, on poor soil. In the same state, a 50-year old plantation, on medium soil, yielded 41,000 feet B. M. per acre. In 75 years, a plantation on poor soil, also in Connecticut, gave a yield of 60,000 feet B. M. In the first example the value of the stumpage was estimated to be \$75 per acre, in the second instance, \$292 per acre, and in the third \$422 per acre. As an ornamental tree the White pine is highly prized because of its silvery, feathery foliage, its symmetrical growth in youth, and its dignity and character in old age. It is extensively planted, not only in its native region, but in distant States, and in Europe it has been recognized as one of the most valuable American trees, both for ornamental and commercial planting.

The White pine appears to have more than its fair share of enemies. In early life grazing cattle and forest fires are destructive. In the Eastern States, the White pine weevil attacks the leading shoots of saplings and kills the tips; usually a side branch turns upward to continue growth, but this causes a bad crook in the trunk, and if the tree is attacked several times, it is

permanently deformed. The gypsy moth defoliates and kills White pine trees at times, and another imported insect enemy, the leopard moth, will become highly destructive to it if it is not controlled. Several other insects, such as the cottony scale, also injure it, as well as a root disease which may be related in some way to the nodules (mycorrhiza) commonly found on the rootlets. The White pine needle blight does not appear to be so detrimental as was feared several years ago.

None of these troubles compare in seriousness with the White pine blister rust, which threatens to become as destructive to the White pines of the United States, both the eastern species and those in the mountains of the West, as the chestnut blight has been to the chestnut trees. The blister rust was brought to the United States from Europe some years ago on nursery stock, and in spite of the efforts made by the National and State officials to prevent this disease from gaining a foothold in this country, new outbreaks have been found each year. The disease has been spread most widely in Massachusetts because of the extensive planting of White pine in that State, but it is also present in Vermont, New Hampshire, Connecticut, New York and Pennsylvania, and a few infections have recently been discovered as far west as Wisconsin and Minnesota.

Efforts to control the blister rust are being made by the various States concerned, in cooperation with the United States Department of Agriculture. The successful outcome of this endeavor depends largely on the interest shown by White pine owners and others in locating infections and in applying the proper measures to prevent the further spread of the disease. It is to be hoped that Byron had not the gift of prophecy when he wrote:

"These blasted pines,
Wrecks of a single winter, barkless, branchless,
A blighted trunk upon a cursed root."

Commercial Uses of White Pine

OTHER American timber-producing trees have a wider range than white pine, but it is not believed that any have yielded, in the aggregate, a larger amount of lumber. One reason for the important position held by white pine lumber for nearly three centuries is the fact that it grew in great abundance and perfection in the region where the settlement and commercial development of America began. The wood is light and resinous, the logs can be floated long distances, and the finest white pine forests existed on the headwaters of all the principal rivers from Maine to Minnesota.

White pine forests originally covered about 350,000 square miles of territory in the United States, and it seems probable that this area has furnished nearly five hundred thousand million feet, b. m., of white pine lumber since 1623, the year that sawmills in New York first

began to manufacture it. In 1635, a cargo of white pine masts was shipped to England from Plymouth, Massachusetts. From this beginning a profitable and extensive foreign trade has developed in "Weymouth pine," as the white pine is known abroad. In the early days, white pine lumber also went from New England to Africa and was paid for in slaves that were sold in Virginia and the West Indies. Because of limited knowledge of the extent of the American wilderness, it was predicted in Massachusetts as early as 1650 that the supply of white pine would soon be exhausted, but in 1700 white pine planks 36 inches wide and 36 feet long were easily procured for the decks of vessels. In 1706 it is known that 70 sawmills were operating on the Piscataqua River, and this was the center of the white pine industry of that period. These mills had only old-fashioned, up-and-down sash-

saws, operated by water power. Each mill could cut only 1,000 to 3,000 feet, b. m., of lumber, and it would have required five times as many of these sawmills to produce the million feet, b. m., that a single Minnesota

transportation, because of the high stumpage value of white pine and the inaccessibility of the remaining timber, was found to be cheaper than water transportation. Thus was lost most of the romance which formerly surrounded the progress of white pine logs from the forest to the mill. The old-time "lumberjack" is passing; here and there are still to be found the men that cut and banked the white pine logs all winter, and followed "the drive" in the spring. They loved the pine woods, and as the years went by, they followed the virgin white pine westward from Maine to New York, Pennsylvania, Michigan, Wisconsin and finally to Minnesota. Never has there been a happier, truer-hearted or more whimsical company in our industrial army. With a creed and a code all his own, the lumberjack of the white pine camp was a product of his environment, and, like the buffalo, the Indian and the white pine, he belongs principally to the "old days."



Photograph by "Pine Cone," Minneapolis, Minn.

SPRINGTIME ON A MINNESOTA RIVER

Logs of the winter's cut are waiting for the floods to carry them into the boom some scores of miles down stream. These smooth pine logs will lose much of their bark during the jams and the bumps of the drive, but the wood will not be injured and such is the material of which high grade lumber is made. On the rising ground back of the river shore, the view shows a fine forest of white pine, apparently without a tree gone. Their turn will come next winter.

sawmill has been credited with being capable of turning out daily.

Through the Louisiana purchase in 1803, a profitable lumber market was opened in New Orleans. This market was supplied by rafts of white pine logs floated down the Ohio and Mississippi rivers from Western Pennsylvania and New York. Some white pine was cut in Michigan and Wisconsin prior to 1830, but it was not until ten years later that lumbering began in earnest in these States. It was not until about 1875 that white pine logs were cut in Minnesota. In Minnesota and Wisconsin white pine was cut on the streams tributary to the Mississippi, and floated to St. Louis and other fast-growing river towns, to be turned into lumber, demanded by the rapidly settling prairie region. A little later, the logs were rafted on the Upper Mississippi River and towed to the mills below. In the "old Beef Slough days" 13,000,000 feet of white pine logs were rafted in a single day. In a few years sawmills were established nearer the source of the logs and more recently, railroad



SQUARES FOR WINDOW SHADE ROLLERS

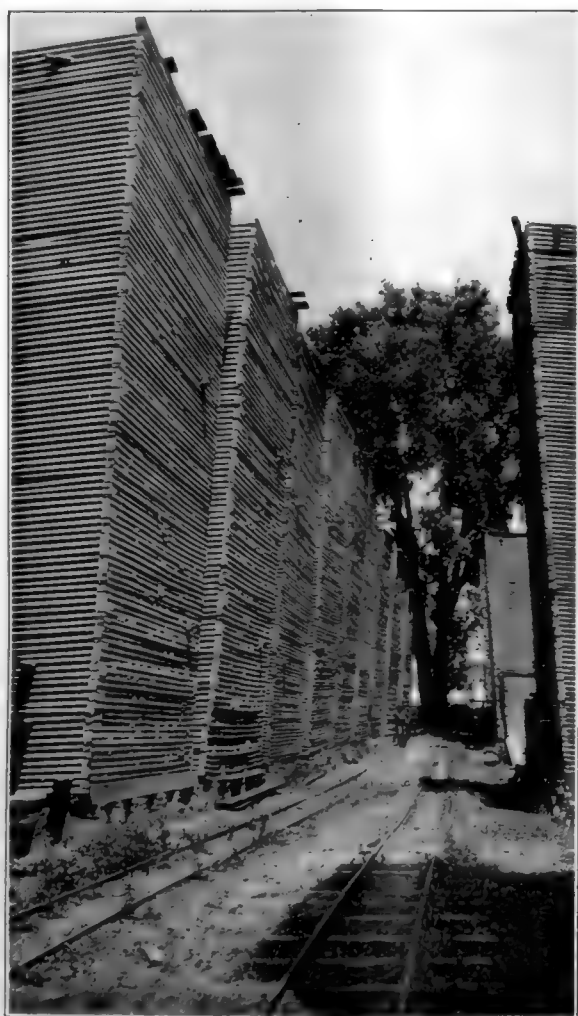
More than 60,000,000 feet of white pine are annually made into shade and map rollers in the United States. This wood is unsurpassed for that purpose, because of its lightness and its disinclination to warp. High grades only are used.

The chronicle of white pine lumbering is the familiar history of wasteful methods in days of plenty, with the sequel of efficient utilization forced through increased demand in the face of diminishing supplies. Perhaps one-third of the possible cut of white pine lumber was lost through logs left to rot in the woods because it was not profitable to saw any but the clearest and

soundest. Fire that was carelessly permitted to burn in the slash left after lumbering, destroyed an unbelievable amount, without doubt, at least, another third. Today white pine is worth \$15 or more per thousand feet on the stump and the greatest care is exercised in preventing waste.

The progress in lumbering white pine is graphically illustrated by a lumber operation in Western Pennsylvania. About sixty years ago this lumberman began cutting white pine in the virgin forests, floating the logs to Pittsburgh to be sawed. Following the methods of his grandfather and father, who had logged white pine in Maine and Eastern Pennsylvania, he at first cut no trees under two feet in diameter. The stumps were four to six feet high, and no logs were cut from the trunk above the first limb; also, it was usual to "butt" the first logs;

out a plan to make a profit from some of this waste material. From the butt logs and high stumps he made split shingles, loaded them on a raft of logs and sold them in Cincinnati for a dollar more per thousand than the regular market price. Thus encouraged, when he built a sawmill on the tract he installed the first lath



STACKS OF WHITE PINE FOR EXPORT

Here is shown some of Minnesota's best product. This grade often called "cork" pine and corresponds to the "pumpkin" pine once abundant in New England. It dries as straight as an arrow. Pattern makers want this kind.

that is, a section 10 or 12 feet long was sawed off the lower end of the first log and left to decay in the woods. This was done because some of these logs were more or less affected by wind-shape and did not furnish the absolutely perfect lumber demanded by the trade of that day. It was not long before the young lumberman worked



NEARLY OUT OF BUSINESS

The refuse burners at the big white pine mills no longer consume much material. Slabs are worked into lath, molding and other small articles, the sawdust goes to stables as horse bedding the chips and splinters are loaded in cars to be hauled to the towns for fuel, and very little finds its way to the waste heap. The picture represents a scene at the mill of the Northern Lumber Company, at Cloquet, Michigan.

mill in Western Pennsylvania and manufactured laths from the white pine slabs that others burned, and was ridiculed for his economy. However, the lath mill produced a profit, and it was not long before other manufacturers followed his example.

This pioneer in conservative lumbering has continued to apply new methods of manufacturing profitable by-products from waste; his mill has no need for a slab-burner as there is not sufficient waste to supply all the fuel needed to furnish power for the plant. In the woods, low stumps are made, and all of the tree that can be saved is taken to the mill. The tops are cut into cordwood and sold to the paper pulp manufacturers; the brush is piled and burned, and should a forest fire be

started in spite of the woods patrol, all employes are immediately called out to extinguish the blaze. Trees thrown by wind or injured by insects or disease are removed as soon as possible so that their full usefulness is obtained and the health of the forest is protected. As a result of this policy, there remains a profitable stand of virgin timber and second growth, sufficient to supply the mill for years to come. A prosperous village has grown up around the sawmill that has operated in one spot for half a century, with a good school, church, stores, pleasant homes and shady streets. It is fitting that the name of this town is Endeavor, and Mr. N. P. Wheeler, the founder, may well take pride.

The rise in the price of white pine stumpage is well shown by the history of a tract of 500,000 acres of white pine timber in Wisconsin. This area was purchased in 1866 by Ezra Cornell, at a price of 60 cents per acre, or less than 10 cents per thousand board feet. A portion of the tract was sold in 1873 for \$4 per acre or about 30 or 40 cents per thousand feet of standing timber. By 1905 practically all of the land was sold and a profit of five and one-half million dollars was realized. Some of this white pine timber brought \$10 and \$12 per thousand feet on the stump, and present prices of stumpage may exceed \$20 per thousand feet if the timber is of exceptional quality and well located. This rapid rise in stumpage value has opened the door to the application of the principles of intensive forest management in producing future crops of white pine lumber. This is especially noticeable in New England, where great interest has developed in planting white pine and in giving proper care to second-growth white pine forests.

The uses of white pine are so diversified that several pages could be filled with the mere enumeration of them. In the day of wooden ships, white pine was highly important for masts, spars, figureheads and decking. Boats of all kinds are constructed of it, and in early times canoes were frequently fashioned from white pine logs. Floating docks made of white pine logs or timbers serve their purpose perfectly, decades after other kinds of wood have become water-logged. Bridges, aqueducts and structures of a like nature were formerly built entirely of white pine timbers, where they were not required to bear excessive strains. Many of the old covered bridges of Pennsylvania and West Virginia were built of white pine timbers, enclosed with white pine siding and covered with white pine shingles. So durable have these bridges been that it was said of some of them that "no man had lived long enough to both witness their building and their failure through decay."

White pine has always been the wood of universal excellence for constructing houses, barns, sheds and other buildings. Early in 1800 Michaux estimated that, aside from the cities, there were half a million houses in the United States that were built of white pine wood. New York and the New England States abound with splendid examples of beautiful colonial houses constructed of white pine, that have stood for more than

a century, or even more than two centuries, testimonials to the wisdom of the early builders in selecting white pine in preference to other materials equally available. Not long ago, ten white pine beams were removed from a building in New York City after doing service for fifty years. These beams were 18 inches thick, 2 feet wide and 50 feet long, free from knots or defects and perfectly sound after a period equal to an ordinary lifetime. Some of the beams are now being used as temporary supports in the New York subway excavations, in a position where their light weight, strength and length, give them superiority over metal or other kinds of wood.

White pine is unequalled as a wood for lath, siding, light dimension, sash, doors, blinds, planing mill products and general mill work. White pine shingles are of high order of merit; where it is not subject to heavy wear, it makes a serviceable flooring. Porch columns, pumps, patterns, picture frames and penholders are all made of white pine, because the wood is less affected by moisture than other woods, neither shrinks, checks nor warps, holds paint and gilt finish well, and its soft, even grain, makes it an easy wood to work with any kind of tools.

Moulding, ceiling, panels, shelves, caskets, baskets, wooden ware, refrigerators, toys, trunks, tubs, shade rollers and skewers are a few of the common uses of white pine. On the farm and in the home, the shop and the factory, this wood has uses galore. Fences, wagon beds, parts of vehicles and machines, wheelbarrows, windmills, handles, beehives, chests and shelves are a few of these. A fine, old, white pine chest made of beautifully clear, wide lumber may be seen by visitors to Longfellow's old home in Portland, Maine.

For a period of 200 years large quantities of white pine were used for such articles of furniture as bookcases, cupboards, counter tops and tables, desks, benches, stools and chairs. While not well adapted to all of these uses, it served its purpose, and for drawing tables and drawing boards it has no equal. It is also one of the best woods for all kinds of boxes and crates, except for the heaviest shipping, because it combines fair strength with light weight, and its light, even color and the smooth surface of the planed wood makes printing show to advantage. Much white pine is manufactured into fish and lard buckets, pails, washtubs, churns, ice cream freezers, spice containers, etc.; it is also a high-class wood for tanks and silos and barrel headings. Logs of white pine were formerly used for wooden water pipes, for which they served better than most woods. Excelsior and match sticks are two other commodities in which white pine is preferred above other woods.

Western white pine (*Pinus monticola*) and sugar pine (*Pinus lambertiana*) are five needled pines with wood very similar in appearance to that of the eastern white pine (*Pinus strobus*). In fact, the qualities of the two western woods are so nearly like those of white pine that they may be substituted for the eastern species for most purposes.

Another Insect Enemy of the White Pine

BY P. L. BUTTRICK

THE white pine is the most important timber tree in eastern North America and has long been a favorite tree for planting purposes, both commercial and ornamental. Hundreds of acres are each year planted to it in the expectation that they will in from 40 to 60 years bring in a considerable revenue from the sale of their timber. As an ornamental tree—whether in small or large sizes—it needs no introduction.

Some fifteen years ago when white pine planting operations on a commercial scale were first undertaken it was thought that the tree in its earlier stages had almost no enemies; however, it has been acquiring them ever since. First the white pine weevil (*Pisodes strobi*) started its depredations. This insect, like the poor, has apparently always been with us, but unlike the poor, has only recently become abundant. The weevil damages young pine plantations by boring into the leading shoot and killing it. Foresters and entomologists working together have devised means of holding this insect in check by cutting out the infested shoots and collecting the adults in nets be-

fore they dig into the shoots. As the trees get older they become immune to the pine weevil. The weevil problem largely disposed of, along came the white pine blister rust—an undesirable alien from Europe brought in on importations of white pine nursery stock. This disease attacks white pine and

currents or gooseberries at different stages of its growth. If the two are permitted to grow close together the rust will severely damage or kill the young pines. Although all importations of white pine from Europe have been stopped the disease has spread to some extent in this country and the Federal Government and some of the States are busy fighting it. It is thought that by prompt action its further spread can be prevented.

The latest addition to the ranks of the enemies of the white pine has been recently studied and reported upon by Dr. W. E. Britton, the State Entomologist of Connecticut, who first discovered it in this country.

The pest is an insect known as the pine sawfly (*Diprion simile*: Hartig). While the white pine weevil attacks the leading shoot of the tree and the



THE DESTRUCTIVE PINE SAWFLY

1. The adults, which, following the white pine blister rust, are now attacking pines in Connecticut and doing considerable damage.
2. The eggs of the pine sawfly in a pine needle about four times enlarged.
3. The cocoons—natural size
4. The larvae feeding on pine—natural size.

blister rust kills the bark, the sawfly eats the leaves. Like the blister rust, the sawfly is an alien—undesirable, of course. It was probably introduced on nursery stock before the institution of the rigid inspection requirements, and is thought to have only recently been introduced into this country.

The larvae of the insect is about an inch long, of green-

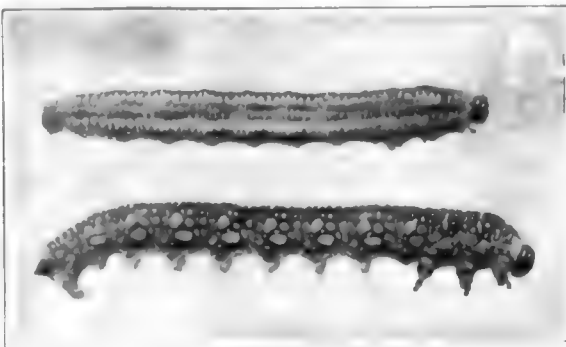


NATURAL SIZE OF THE PINE SAWFLY COCOONS

The cocoons on the left have been torn open probably by birds, those on the right show exit holes of the chalcid parasite.

ish-yellow color, has a black head, a brown stripe down its back, and a yellow stripe with brown markings on it on each side of the body. The adult is a small wasp-like insect with a wing spread of about an inch. The cocoon is formed among the leaves and branches or falls to the ground beneath it. The cocoon is about three-eighths of an inch long and brownish in color.

The adults emerge from their cocoons late in April or early in May. There are two, rarely three, broods. The larvae feed during May and June for the first brood and during August and September for the second.



TWO VIEWS OF THE LARVAE

The dorsal and the lateral views of the larvae of the pine sawfly, twice enlarged.

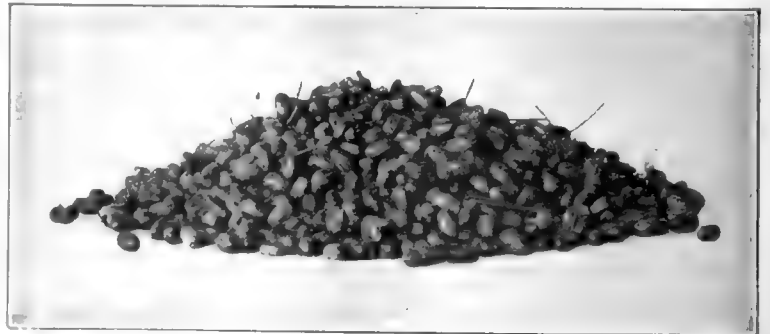
The larvae feed on the needles of the pines—particularly seedlings, often entirely defoliating them. In Europe the insect has several times caused serious damage in its outbreaks. There it attacks mature trees as well as seedlings and young trees. These outbreaks have oc-

curred in the pine forests of southwestern Russia, in Sweden, Prussia and France. In England its attacks upon Scotch fir have occasionally been serious. In Connecticut it has already been found on the following species of pines:

White pine (*Pinus strobus*), limber pine (*Pinus flexilis*), Scotch pine (*P. sylvestris*), Japanese or Botan pine (*P. excelsa*), Japanese red pine (*P. densiflora*), Korean pine (*P. koraiensis*), Austrian pine (*P. austriaca*), Cembrian pine (*P. cembra*), Mugho pine (*P. montana*).

Only the first two are native forest trees, yet there is no reason to suppose that it would not occur on all our native pines as well as those of Europe and Asia. It might also occur on other conifers as well as pines in this country as it does to some extent in Europe. For the present at least it will doubtless do more damage to white pine than any of the others, since it is the most common and important pine in the region where the insect has become established.

So far the insect has been found in this country only in Connecticut, but seems to be well distributed over the State, and is doubtless present outside of it, possibly wherever imported pine



A PILE OF COCOONS

These cocoons of the pine sawfly were collected from pine twigs. There are 1,617 cocoons in this heap.

stock has been planted, and much has been planted.

Dr. Britton finds that when the pine sawfly is present in nurseries or on small ornamental trees, spraying with lead arsenate when the larvae are active is a good remedy. As some of the cocoons fall to the ground it is desirable to rake up the leaves and litter beneath the trees and destroy it. All nursery stock should be carefully inspected and cocoons removed to prevent the spread of the pest.

Whether this pest will prove serious, or whether, like the pine weevil, we will be able, by a little care at the proper time, to keep it in check remains to be seen. It is certainly too early to discourage the planting of white pine because of it, but nurserymen, foresters and all pine plantation owners should keep a sharp watch for the insect and take prompt action to exterminate it wherever it appears.

Glacier National Park

BY MARK DANIELS

Former Superintendent of National Parks.

GLACIER is the only park in our system of National Parks which is purely Alpine in character, and its forests seem to justify the contention on the part of those who live in Montana that Glacier National Park put the pine in Alpine. It is situated in the northwestern corner of Montana and is traversed in a northerly and southerly direction by the main crest of the Rocky Mountains. The continuation of this range into British Columbia constitutes the Canadian Rockies and the scenic area in the vicinity of Banf which has been set aside by the Dominion Government as a Canadian national park. It might incidentally be added that this same Canadian Government Park has received an appropriation several times larger than that which has been set aside by the United States Government. As a result, the number of citizens of the United States who

are familiar with the beauties of the Canadian Rockies in the vicinity of Lake Louise and Banf far outnumber those who know of the equal beauties of Glacier.

The area now within the boundaries of Glacier National Park was at one time possessed by the Blackfeet Indians and was part of their reservation, the remaining portion of which is contiguous to the Park on the eastern border. The Park, of course, is not the only thing which the Government has taken from the Indians. However, the little game of "robbing the Indians" is not properly part of the subject matter of an article on National Parks, even though the discussion of its fascinating phases might be justified in view of the fact that, properly administered and developed, this particular holding, which was once part of the Blackfeet Indian Reservation, might be put to a more utilitarian



MAJESTIC PEAKS CONFRONT THE TOURIST

So many of the canyons head in small lakes which lie at the very foot of towering precipices, from the broken and stepped surfaces of which small streams of snow and ice water trickle to the lake below.

use than the Indians could ever hope to accomplish.

Scenery there is in abundance, together with innumerable forms of wild life, and it was undoubtedly the part of wisdom to open this most wonderful district to the scenery loving citizens of the United States. But to merely set aside an area and announce through a small bulletin,

the total issue of which would not circularize the residents of St. Joe, hardly constitutes opening a great scenic area to a country of one hundred million population; yet this is practically all that the Federal Government has done until a very recent date. That the people of the United States are fairly well informed about the conditions in Glacier National Park and that they may travel through it in more or less comfort, receiving en route courteous attention and that consideration which is well calculated to soothe the temper of him whose attention is invariably concentrated on an empty stomach, is due almost entirely to the efforts of Mr. Louis W. Hill and the Great Northern Railroad. In turn, Mr. Hill may thank such public-spirited men as Mr. Emerson Hough and Mr. George Burt Grinnel for the real pioneering which resulted in bringing this territory to public attention, for it was largely Mr. Emerson's Hough's articles describing the unsurpassed beauty of the hanging glaciers, sparkling

streams and glorious lakes of this bit of transplanted Switzerland, which first attracted the attention of nature lovers throughout the country.

Prior to the act which set the Park aside as such, Mr. Hill had made many trips through the mountains and no doubt used what influence the Interstate Commerce Commission had not amputated to get the Park created. This was accomplished in 1911, and despite his reputation as a good business man, Mr. Hill immediately began to erect hotels, chalets and camps throughout the Park in the face of the disastrous experiences of other concessionaires who had tried to operate on a paying basis under Government control in the National Parks. In the meantime, for the same year, \$15,000 only was appropriated for the administration of this Park, the area of which is 1,534 square miles. Since that time it is only fair to say Congress has appropriated in all \$320,000 up



WORTH MANY MILES OF TRAVELLING

The spectacular manner in which apparently isolated peaks raise their lofty crests to such great altitudes that their reflections in the nearby lakes can only be secured from distant points, is a characteristic of the formations in Glacier National Park.

to and including 1915, which sum, it should be said, is less than one-quarter of the amount of money that Mr. Hill has spent in the same time in the same reservation. Perhaps it was the knowledge on the part of those in authority that the railroad interest would be forced to do this work in case the Government did not, but in any case, the fact that there is a chain of chalets crossing the Park, a large hotel at the eastern

entrance, three other large hotels in the Park and one at the western entrance, is due entirely to the energetic efforts of public citizens. Before launching forth in that form of eulogy on Glacier National Park, the thoughts of which thrill the bosom of everyone who thinks or writes about it, it would seem wise to outline the physical characteristics of the area so that subsequent statements may be justified or at least appear substantiated by a semblance to fact.

The Continental Divide traverses the Park longitudinally in a northerly and southerly direction and approximately in the middle of the area. The western slope, receiving more of the afternoon sun, is not so plentifully supplied with glaciers and is more heavily wooded. On this side the canyons are wider and less precipitous and the lakes larger and more plentiful. The streams rise almost at the summit of the Divide and quickly find

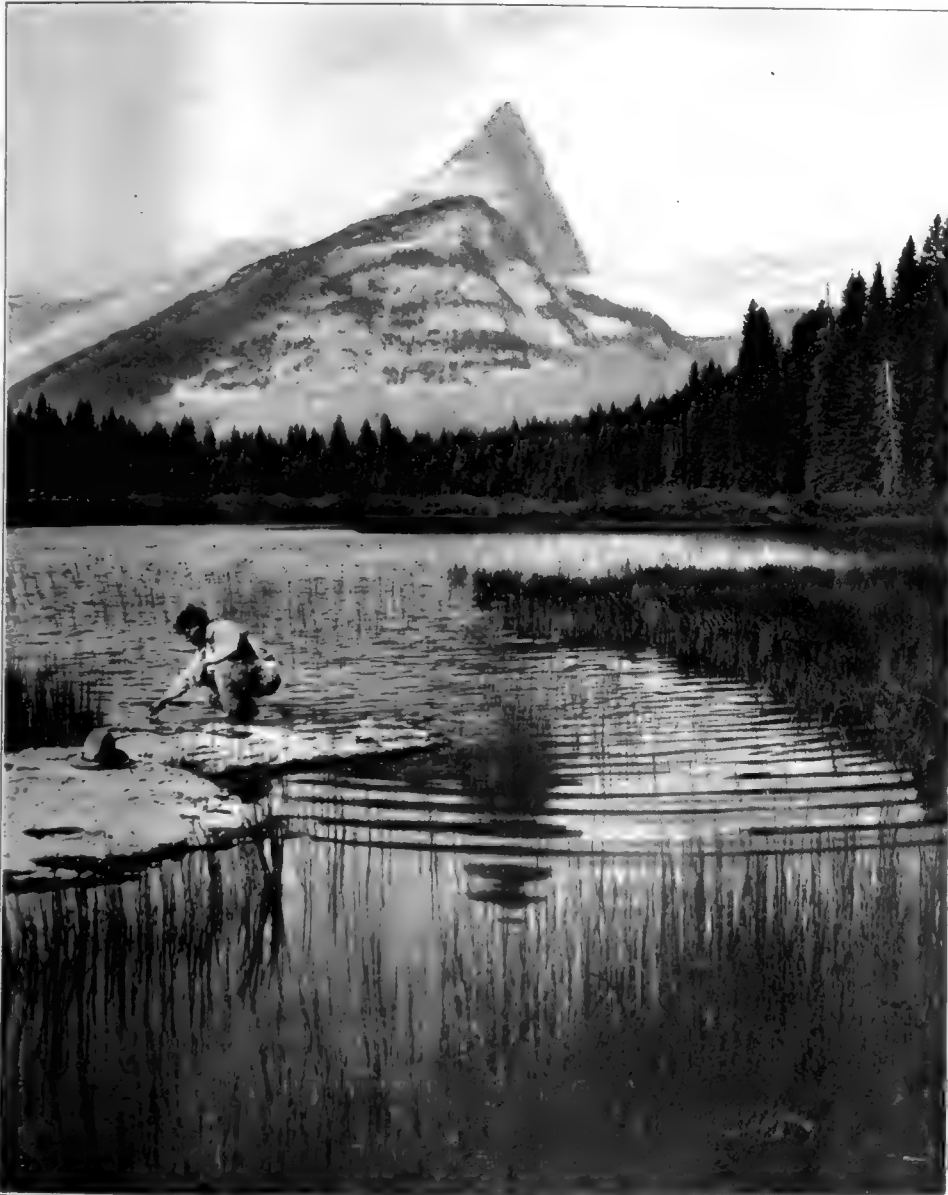
the level of the lakes through which the waters of the snow and glaciers pass to join the main and middle forks of the Flathead River which bounds the Park on the east and south sides, respectively. The eastern slope is more precipitous, rugged and broken up with innumerable pockets, as it were, here and there, in which will invariably be found a sparkling lake, on the placid surface of which are reflected the silhouettes of the surrounding lofty peaks. On the western slope there are fifteen main canyons which carry streams from

the summit of the Continental Divide to the Flathead River and its middle fork, and in seven of these there are lakes ranging from one mile to ten miles in length, surrounding all of which is a superb forest of pine, fir and cedar. On the eastern slope it would be almost impossible to count the small canyons, heading in glacial

cirques and mountain tarns, which stray toward the Blackfeet Indian Reservation. There are, however, some eight or ten that are large enough to be readily recognized as real, grown-up canyons, the largest being the St. Mary Canyon, in which is the Upper St. Mary Lake, about ten miles in length.

Despite the fact that this is the most broken up and rugged area of its size in the United States, it is strangely easy to traverse on horseback and lends itself to devel-

opment in a most simple way. There are no such great areas of almost impenetrable territory as can be found in



HERE BEAVER DAMS MAY BE SEEN

The trail from Going-to-the-Sun Camp to Gunsight Pass skirts the border of several beaver ponds. In this one the reflection of Fusillade Peak is sometimes so perfect as to form an excellent test of sobriety. The success with which the beavers build their dams in this Park strongly suggests the advisability of establishing a school of training for the engineers of the Reclamation Service in the immediate vicinity.

Yosemite National Park and the Mt. Whitney country, for, with the exception of the vicinity of "The Garden Wall," as it is called, it would be feasible and practicable to build trails throughout the entire Park that would be comparatively safe and inexpensive. At present, however, there are only a few circuits which are connected up in such a manner as to make a continuous trip practical, and it is along these circuits that the chalets, hotels and camps of the Great Northern Railroad Company have been built. The most pictu-

resque trip of all is the one which crosses the Park from east to west along St. Mary Lake, over Gunsight Pass to Lake McDonald.

This trip may be taken from either the eastern entrance at Glacier Park Station on the Great Northern Railroad, emerging at Belton on the western side, from whence the westward journey is resumed, or vice versa. From Glacier Park Station an automobile stage carries the passengers through the Blackfeet Indian Reservation, entering the Park about thirty miles to the north, at the

of the lake, there is a small promontory on which has been built a chalet of split shakes with roof weighted by heavy stones. Behind it Little Chief Mountain towers 5,000 feet above the surface of the lake, casting its purple shadows athwart the neck of the gorge. Ringing the head of the canyon are Almost-a-Dog, Citadel Mountain, Fusillade, Reynolds, and that most glorious of American peaks, Going-to-the-Sun Mountain.

The hotel, or more properly the group of chalets, is located on the north side commanding a view up and



ONE OF MANY SUCH VIEWS

Every ridge and spur is broken here and there with a gap through which the serrated crest of the range beyond shows like the front sight of a gun through a notch. Generally there is a small lake somewhere in the picture, nestling at the foot of the crumbling cliffs.

foot of the Upper St. Mary Lake. From this point to the hotel at the head of the lake, one may go either by automobile or by boat. If properly advised, he will take the latter route. There is probably no water trip in the world which is more wonderful than the journey up St. Mary Lake into the very heart of the Continental Divide. The walls of the canyon become more and more abrupt until the reflected tops of the walls and surrounding peaks are lost in the depths of the sparkling blue water and it seems that the little boat and its passengers must be crushed in the jaws of the "Demon of the Great Divide." Just beyond the point on which the hotel is located and across the narrowest portion

down the lake and of the surrounding peaks. Unfortunately, the location is too near the base of Going-to-the-Sun to give the best view of that most wonderful of mountains. I know of no peak in the United States whose lofty crest seems so crowned with glory and dignity as this one, nor is there any point of interest on this continent so aptly named. The propriety of the Indian names for the peaks and valleys strongly suggests the advisability of putting an Indian upon the board of United States Geographic names, but it is not surprising that this idea has not occurred to a committee who sees fit to abandon the proper and fitting Indian name of an inspiring peak for some such name as Mt.

Doody, Howe Ridge and Trick Falls. Such names as Going-to-the-Sun Mountain, Almost-a-Dog, Rising Wolf, Piegan Pass, Two Medicine Lake and Red Eagle Pass, taken from the Indians and their legends, suggest the romance of an earlier time, contrasted with which such names as Mt. Stimpson, Mt. Thompson and Spot Mountain, seem about as appropriate as a bar room in a cathedral. However, each succeeding administration sees another Indian name taken from peak, lake or

the north, was named after a curious and rather disheartening experience of a man whose self-acknowledged ability with the rifle had led him to retain the company of an Indian on a hunting trip over the mountain. The story goes that a large bear arose in the trail but a short distance in front of the two hunters. The Indian was of course unarmed and in the rear. The white man, who, by the way, had married an Indian maiden, began shooting at the huge target which was not a stone's



AN ENORMOUS HANGING GLACIER

To the west of Piegan Pass there is a canyon several thousand feet in depth. The western wall of this canyon rises abruptly and towers to a great height above the trail to the Pass. The picture here shown well illustrates the type of hanging glacier which is so frequently encountered along the trails through the Park.

glacier, and quietly enforces the substitution of the name of some politician whose conception of his own importance seems only to stop short of an actual effort to have the name of the pleiades changed to something which is possessed of more vote-getting propensities.

It is not always possible to trace the source and origin of the names of these peaks and lakes, although there is little doubt that most of the names given by the Indians were prompted by either some legend or incident which happened in the life of one prominent chief or another. Fusillade Mountain, which lies at the head of the St. Mary Canyon, and bounds Gunsight Lake on

throw away. By the time he had fired all but one shell he lost his nerve completely and turned to run. As he rushed past the Indian in his precipitous flight, the latter snatched the gun from the white man's hand and shot the oncoming bear through the heart with the last bullet. The erstwhile white man had fired his ammunition so rapidly that to those at the base of the mountain it sounded like a veritable fusillade and the mountain was known thereafter amongst the Indians as Fusillade Peak, or, rather, by some word which, in their language, approximated the word fusillade as closely as possible. The trail from St. Mary Camp or hotel over Gunsight

to the head of Lake McDonald skirts the southern base of Fusillade Mountain and at Gunsight Lake rises to an elevation sufficient to bring out the reflections of the ridge in the little lake below.

The trail from St. Mary Camp to Gunsight Pass is for some eight miles along a comparatively level stretch of ground at the bottom of the St. Mary Canyon and skirts the meadows and beaver lakes which dot the valley floor from the upper end of St. Mary Lake to Gunsight Lake. By leaving St. Mary at a reasonably early hour, Gunsight Lake and the chalet on its border are easily reached by noon, where a surprisingly good lunch is served with which one can fortify himself for the climb to the Pass.

Gunsight Pass lies approximately midway between the camp at Gunsight Lake and the Sperry Camp on the west side of the Divide. If the trip is taken in the direction of east to west, the Pass bears no resemblance whatever to a gunsight until the western edge of Lake Ellen Wilson is reached. From this point, by looking back, the distant shoulder of Mt. Jackson may be seen through the notch of the Pass like the front sight of a gun. If the time is about four in the afternoon the picture is one that will never be forgotten, for the notch will probably be in shadow while the peak in the distance will be aglow with the afternoon rays. It is but a mile or two from the lake to Sperry Camp at the head of Sprague Creek where food and shelter can be had for the night. The camp is located at an elevation of about 6,500 feet and commands a view of Lake McDonald, over 3,000 feet below, and the pine-covered ridges of the Blackfoot National Forest further to the west. From

this chalet it is but two miles to the Sperry Glacier, which lies on the northern slope of Gunsight Mountain and supplies Avalanche Lake with the milky water that makes it one of the most beautiful gems of color in the Park.

From Sperry chalet to Lewis's, at the head of Lake McDonald, is but a short trip through the dense forest

covering the western slope along Sprague Creek. If properly timed, arrival at this unusually good hotel is sufficiently early to permit of some loitering in the vicinity which will invariably prove to be well worth while. From the hotel to Belton the trip is made by boat on Lake McDonald and a three-mile drive by stage from the foot of the lake to the railroad station.

This route constitutes the one generally taken by tourists who wish to travel more or less de luxe, and while it seems particularly strenuous and somewhat



A VIEW ALONG THE TRAIL

Along the entire trail from Piegan Pass to McDermott Lake, the towering heights of the Garden Wall dominate the scenery. The knife-like ridge of this portion of the Great Divide seems to be but a few hundred feet in thickness where it peeps over the crest of the formations in the foreground. Snow-white streams of snow and ice water trickle down the faces of the cliffs to keep the fields of wild-flowers fresh throughout the summer.

terrifying at the time, it is one that can really be taken with little or no inconvenience and without any serious delay in westward travel. If the tourist, however, has more time at his disposal, there are other trips that would more than justify the time necessary. For example, from Going-to-the-Sun Camp at the head of St. Mary Lake there is a trail leading to the north up Reynolds Creek to Piegan Pass. The trail is almost wide enough to accommodate a small motor throughout a large portion of its length, and climbs steadily and gradually to an elevation of about 7,200 feet at the summit of the Pass. From this point the view to the south is astoundingly impressive. Most of the Blackfoot Glacier, covering several square miles, lies sparkling in the sunshine like a white diamond held in the forked setting formed by the ring of lofty and jagged peaks that make a semicircle in the Great Divide about the head of St. Mary Canyon.

To the west, on the eastern slope, is a smaller hanging glacier, from the blue white face of which small streams tumble down the almost vertical face of the mountain to the canyon floor below. It is truly difficult to leave the place, and the regrets of departure are sharp until the descent of the northern side of the pass is begun.

From here the trail swings around the base of the Garden Wall, as it is called, and follows the course of Cataract Creek. From one point in the trail just below Mt. Gould this stupendous cliff rises to a height of over 4,000 feet above the trail, forming a precipice that competes favorably with the heights to be found in Yosemite and Whitney country, with the added advantage that the rock is richly colored in deep red and purple hues. There is no bit of trail in the Park that is more beautiful than the lower reaches of the trail along Cataract Creek which emerges onto the floor of the canyon by Lake

Pass to Granite Park, the trail of which passes along a series of unnamed lakes and climbs to the summit of the Divide to a point about seven miles from Lake McDermott. All along this trip one is apt at any time to discover here and there on the apparently vertical faces of the cliffs scrambling goats that seem to be creeping like flies up the mountain sides, or to flush a grouse, or disturb the peaceful meditations of a ptarmigan hen.



NELLY NO-CHIEF

So yeapt in spite of the American repugnance for hyphenation, has no dread of the camera, nor does she wear a costume in keeping with her title. The Blackfoot Indian maidens are in general rather more attractive than any of the tribes in the Northwest.

Josephine and McDermott Lake. At the latter place the Great Northern Railroad Company has this year completed a hotel which is considerably larger than the one at Glacier Park Station. It faces to the west, overlooking Lake McDermott, and, as the evening draws on, lies in the shadow of Mt. Grinnell. From this point there are several side trips to be taken that are astoundingly beautiful. There is the trip over Swift Current



THE INDIANS OF THE PARK

The Indians of the Blackfoot Reservation congregate about the Glacier Park Hotel and display none of that repugnance for photography that is almost invariably encountered amongst the Indians of other tribes.

From Granite Camp a new trail has recently been built, leading down to the upper end of Lake McDonald, and it is now practical and feasible to cross the Great Divide by a route other than the one over Gunsight Pass.

Another most interesting trip is the short one to Iceberg Lake, about seven miles from Many Glacier Hotel on Lake McDermott. The trail follows along Wilbur Creek, turning at the first main fork toward the west, and winds up the small canyon to the little lake that lies in a cirque below the crest of the Divide. On the western edge of the lake a glacier dips its toes into the pale blue waters and now and then fills the canyon with the roar of falling icebergs. The sight of one of these huge bergs of ice falling into the sparkling water is one that is not easily forgotten. It was my good fortune to emerge onto the level of the lake just as a berg broke off from the face of the great glacier and fell into the

lake with a roar that reverberated for several minutes through the canyon. It disappeared completely from sight and then arose with its snow-white top swaying gently from side to side, spilling sparkling streams of water from the ice cups of its surface. Such a sight



UNEXPECTED AND CONVENIENT

The appearance of a modern pleasure launch on the surface of a 10-mile lake in the heart of the high Rockies invariably strikes one as a bit of anachronism. The pleasure, however, which it affords, always tempers what little heat of antagonism may be left.

invariably prompts a man to scream or swear or otherwise give evidence of that unfamiliar emotion which is always aroused by God's phenomena in him whose conception of magnitude is born of his knowledge of skyscrapers. If you are a hard rider and can tear yourself away from the beauties of this spot, it is possible to run up to Grouse Lake at the head of the other fork of Wilbur Creek on the return trip, but unless the feel of a mule between your hardened knees is old and familiar, it is not advisable to attempt the round trip in one day.

There are so many trips and so many spots of glorious colors in this Park that it is not within the scope of a magazine article to enter upon any detailed account of them. There are the Glens Lake, the Canyons of the Belly River, Waterton Lake, which is split by the international boundary line. The broken and disrupted country in the vicinity of Logan Glacier, the great Kintla, Bowman and Quartz Lakes, and countless other fascinating spots in the northern part of the Park where few people ever travel.

On the other hand, there are the Upper and Lower Two Medicine Lakes, than which there is no more beautiful sight held within the spell of mountain peaks which are but a few hours' horseback ride from the hotel at Glacier Park Station. In fact, there is within the boundaries of this Park scenery of every kind which is accessible to people of almost every kind of physical condition, fishing and camera hunting to the heart's content, and it is to be devoutly hoped that our Federal Government may see fit at some time or another to appropriate sufficient money to make all of this Park accessible by roads and trails to those who love their country and contribute to its support.

A FORESTRY MAXIM

La Asociacion de los Amigos de la Fiesta del Arbol, of Barcelona, Spain, has just issued "La Cronica de la Fiesta del Arbol en Espana," a beautifully gotten up book of 184 pages, giving a description of the "Arbor Days" held in Spain during 1914 and 1915. Among the "forestry maxims" quoted is one which says, "He who plants a tree does a good work, he who plants many rebuilds and enriches a portion of his native lands and achieves a conquest which causes not one tear nor sheds one drop of blood."

RESOLUTION ON FOREST FIRES AND REFORESTATION

THE following resolution introduced by Prof. P. S. Lovejoy, of the University of Michigan, was adopted by unanimous vote at the spring meeting of the

Technical Association of the Pulp and Paper Industry, held at Kalamazoo, Mich., and the secretary was instructed to send copies of it to the various State forestry associations, the Governors of States and the press generally:

Since wood is an essential raw material of the pulp and paper industry, and

Since the supply of timber suitable for pulp manufacture is rapidly decreasing and its cost is rapidly increasing, and

Since there are great areas of non-agricultural lands in the Lake States, which lands once produced splendid timber, but are now practically barren as the result of lumbering and repeated fires.

We therefore urge that the pulp-producing States take immediate action.

(1) Looking toward the better protection of these non-agricultural lands from fire.

(2) Looking toward the restocking of such lands where necessary by planting.

TOYS FROM SULPHITE PULP

AT THE recent toy manufacturers' convention held in Toronto, Sir George E. Foster pointed out to the members the possibility of making toys of all kinds from sulphite pulp, which was much cheaper than brass, copper and other metals, which have risen very much in price owing to their demand for use in making munitions. A toy-making industry has recently been established in Berlin, Ontario, which is making lighting fixtures from sulphite pulp. The material is blown under molds under pressure and given any desired finish.

The Bird Department

BY A. A. ALLEN, PH.D.

Assistant Professor of Ornithology, Cornell University, Ithaca, N. Y.

THE ENEMIES OF BIRDS

WHEN the white man first came to this country and before he began clearing the forests and starting the rudiments of our present agriculture, he found what has been called a "balance of nature." Each plant and animal in the struggle for its existence and the persistence of its kind, had developed a strength and a productive capacity that required holding in check by the struggles or foraging of other species. And each species was so held in check that this balance existed. While this condition endured there were no weeds, no insect plagues, and no infestations of small rodents. Each species increased up to the limit of its food supply and then was controlled by starvation and the attacks of its enemies. Insects and rodents, together with the lack of sunlight due to the shadows of the forests, kept the vegetation within bounds. The insects and rodents were held down chiefly by the birds, and an excess of birds was prevented by the carnivorous animals and a few species of hawks.

control and became "weeds." The effect on the insect life was equally remarkable. The locust and the cricket, formerly fighting for a meager existence on the prairie grass, suddenly found themselves in a Garden of Eden and increased so tremendously that for a long time in the Mississippi Valley, it was almost impossible to raise crops



AN ENEMY OF THE BIRDS

The raccoon is as good a climber as the cat and nearly as destructive to bird life but, of course, not nearly so abundant.

When the early settlers cleared the forests and planted and cultivated their gardens, they let in the sunlight, they enriched the soil and they supplied the native plants as well as their crops with suddenly increased nourishment. Thus they all flourished. New plants that had had to starve in the old country crept in with the crops, and responding to the luxuriant conditions, escaped beyond con-



THE RED SQUIRREL

On friendly terms with the birds at a feeding station but individual red squirrels often develop nest-robbing habits.

of any kind. The Colorado potato beetle which had been eking out its existence on a few species of plants related to the potato in the Rocky Mountains, was suddenly confronted with a perfectly inexhaustible food supply in the open cultivated fields where there were no birds or other enemies. Each female beetle lays so many eggs and the young transform to adults in such a short time that in a single season it is possible for the offspring of one pair of beetles to number over sixty millions. Quick to respond, this beetle in a very few years spread from its native State all over the West and throughout the East until it became a perfect scourge in all places.

But what of the natural enemies of the insects, the

birds? Before them, likewise, was thrown a greatly increased food supply. How did they respond? Of course their reproductive capacity cannot compare with that of plants or insects, but it is sufficient to allow of great increase. Undoubtedly this increase did take place, and today there are unquestionably more robins, song sparrows, and chipping sparrows than there were 300 years ago. But unfortunately, birds require more than food. They must have shelter for themselves and their nests and the cultivated fields offer this to only very few species. One more factor, perhaps the most important of all, is necessary to bring about an increase, and that is a lessening of the number of their enemies. As long as there are carnivorous animals to gobble up the young as fast as they flutter from the nest, or predaceous birds to pounce upon the adults as they incubate, we can hope for but small change in their numbers. A reduction of these enemies, however, would undoubtedly cause an immediate increase, for few species are living up to the limit of their food supply, and if necessary this could be readily augmented.

Of the enemies of birds, the lynx and the marten, the mink and the weasel, the fox and the raccoon certainly decreased very rapidly before the encroachments of agriculture and are now rare in most places. The hawks that prey upon birds are likewise more scarce, so that there is apparently no natural reason why the birds should not have increased proportionately with the vegetation and the insects. But, stop for one minute and remember that for every lynx that has been shot, for every fox that has been hounded, for every marten, mink or weasel that has been trapped, there have been brought in by civilized, unthinking man at least two dozen ferocious, bird-killing cats; black cats, white cats, maltese cats, angora cats, house cats, barn cats, alley cats and stray cats, all with 18 sharp, skin-ripping talons and 30 flesh-tearing, bone-crunching teeth; all with an inborn instinct to hunt and to kill; unsatisfied by any amount of food and, with few exceptions, every one of them turned loose every night of the week to make the night hideous with their love chants and gory with the blood of their

victims. If we could make a funeral pyre of the birds killed during the month of June by cats alone, in the United States, it would conceal the Washington Monument.

Data recently collected by E. H. Forbush, the State ornithologist of Massachusetts, and the opinions of naturalists all over the country prove the domestic cat to be the greatest scourge to bird life in this country. Yet most owners of cats feel little or no responsibility. If a neighbor's cow gets into one's garden, or a neighbor's dog into the sheep pen, there is a great uproar. The dog must be killed, damages must be paid and the law will uphold such a course. If, however, the neighbor puts his cat out at night to shift for itself and, in the early morning it comes to one's garden and pounces upon the wren gathering spiders for its young or springs upon the chipping sparrow picking worms from the cabbages or climbs the vines and snatches the young robins from the nest on the porch, nothing is said, nothing can be done. No one is held responsible but the cat and the cat has merely followed its instincts to hunt.

When the neighbor's cat has kittens, they make interesting playthings for his children, but when they get big enough to scratch and their food gets expensive, he finds that he must part with them. He is too tender-hearted to kill them, and so he puts them in a basket and carries them to the edge of town and drops them over the fence into the nearest woods to shift



AN EFFECTIVE SPARROW NET

About twenty feet square, made of cheese cloth. It is raised into place against the ivied walls after the sparrows have gone to roost and when lowered it scrapes them from their perches. Over 500 have been taken from one roost in a single night. The numbers of house sparrows must be considerably reduced before great headway can be gained in increasing our native birds.

for themselves and their bird killing begins.

Later on the neighbor goes to the seashore and, being very fond of his cat, he takes it with him. It is fine for the cat to have this outing with a new roaming ground, and the cat shows its appreciation by hunting most of the time. When preparing to return home in the fall, our neighbor is a little late in getting started for his train, or he can't find the cat basket, or the cat is off hunting, and so, expressing his regrets that he should have lost such a fine cat or wondering if it will recognize him when he comes back next year, he starts for the city and leaves the cat behind.

Some day after the close of the season at such a resort, go out in the morning after a light fall of snow and track

the wild animals of the nearby woods. Perhaps you will find the tracks of a red squirrel; squirrels are very clever and usually manage to exist even in cities. Perhaps you will find the tracks of a cottontail; rabbits are very prolific and stand a great deal of persecution. Probably you will find the tracks of a few rats and mice; but be assured you will find crossing and recrossing, the tracks of at least one stray cat. I do not believe there is a place in Eastern United States within five miles of a human habitation where you will not find the tracks of domestic cats more frequent than those of any wild animal, squirrels, rabbits and mice excepted. Trappers catch them in their traps set in the wilds, hunters find them in the deep woods when hunting for bear and deer; and time and again, when I have been in the woods far from any house, "squeaking" to call up the birds, I have become aware of some light-footed animal sneaking up through the bushes ready to pounce upon the young bird which I am imitating. Once in a great while it is a weasel; less often it is a fox, and forty-nine times out of every fifty it is nothing but a stray, hunting cat. At times I have recognized the cat as belonging to a neighbor whose cat "never catches birds," but more often it is a lean, wild-looking animal that knows no owner and may even have been born in the woods, for we are rapidly developing a strain of half wild cats that spend their entire days in the woods and fields and have never known the habitations of man.

"But my cat never catches birds," is the response of many people. "I whipped it every time it caught a bird until it now knows better."

Yes, undoubtedly the cat can learn, for cats are certainly quite intelligent, but they merely learn not to bring into the house any bird that they catch.

It is true that cats can be taught not to touch caged birds; they have even adopted young chickens and tame quail. But put any cat out into the woods and fields, let a young bird flutter from a nest or an old one venture too close in its defense, and no matter how well trained, no matter how stupid or slothful the cat, it could not resist its instinct to capture. A great deal can be done and

ought to be done to minimize the chances of one's cat catching birds and certainly the number of birds killed by cats can be greatly diminished. Every owner of a cat and every cat-lover should feel it his responsibility to cooperate with the naturalist and bird lover to control the depredations of this animal.

This does not mean that all cats should be killed or that there is no place in the general scheme of things for the domestic cat. The lion is safe in the circus cage; the tiger does no damage in the zoo; the bloodthirsty little ferret can be kept by anyone with impunity. Dy-

namite, strychnine, and carbolic acid all have their value, but all are kept with responsibility and used with caution. If one has a fondness for the playfulness of the kitten or cares for the indifference and selfish responses of Tabby or likes to raise fancy breeds of cats for display, it is perfectly legitimate that he should possess them. If one prefers to care for a cat rather than to set a trap, the former will often prove nearly as effective as the latter in destroying those obnoxious little rodents that often do much damage. A good rat-catching cat (and they are scarce) is a decided asset about the barn. But, if one decides to keep a cat, he must at the same time decide to assume the care and responsibility which its ownership imposes. It is not true that a cat makes a better ratter if it is not fed. Cats have much more patience to wait

at the rat hole or to stalk the mouse if they are fed regularly. Moreover, if a cat is kept to catch rats and mice in the house and barn, it should be kept where it is supposed to hunt and not turned loose in the woods and fields where hunting is so much easier. It is a common practice to put the cat out at night just when it is most needed inside and just when it can do the most damage outside. If this practice could be stamped out, if everyone would put the cat in the cellar or lock it in the barn at night and feed it in the morning before turning it loose, the cat problem would be solved. No one would keep any unnecessary cats; stray, hunting cats could be identified as such and put out of the way, and the country would soon be



A BIRD FOUNTAIN

Many species of birds visit such fountains daily and add very much to the attractiveness of the garden. The fountains are of many varieties, few of them costly, most of them artistic.

enriched by the addition of the thousands, even millions of birds that are annually killed by cats.

In discussing the enemies of birds, I have dwelt at length on the domestic cat because I believe that it is by far the most important, most deadly of them all. Our birds are able and always will be able to contend with their natural enemies. The lynx, the fox, the raccoon, the mink, the weasel and the skunk are rapidly disappearing before the inroads of the trapper and nowhere exist in sufficient numbers to affect bird life seriously.

The bird-killing hawks and owls are nowhere abundant. Crows, jays and squirrels do not levy a heavy toll, though at times they are very destructive to eggs and nestlings. All of these animals, however, have their economic and aesthetic value which forbids their wholesale slaughter. If an individual red squirrel is seen robbing a bird's nest, he should be shot, and if a crow takes to visiting the robins' nests in the orchard, he, too, should be killed, for it is impossible to cure this carnivorous habit. Opprobrium should not be heaped upon the species as a whole, however, because of the misdeeds of a few.

Concerning the English or house sparrow whose fondness for human habitations, adaptability, and great reproductive capacity have caused it to replace a large percentage of the native birds about our cities and villages, much might be said. It is undoubtedly true that before we can increase our native birds in such places it will be necessary to reduce the number of sparrows. It will never be possible, however, to exterminate the house sparrow although concerted effort has succeeded in ridding a few localities, notably Meriden, N. H., and Oberlin, Ohio, of them. But county systems and wholesale slaughter are seldom to be recommended because so many other species are killed by mistake. It is possible, however, by consistent trapping and netting to reduce their numbers sufficiently to make room for a great increase in our native birds. The nesting boxes that are now put up for bluebirds, martins, tree swallows and woodpeckers will then be used by these birds instead of being usurped by the sparrow. The barn swallows and cave swallows will return to



BEWARE, ROBIN!

More birds are killed by cats than by all their other enemies put together. The stray unfed cat is the deadliest, but even the pampered Persian springs upon them whenever opportunity offers.

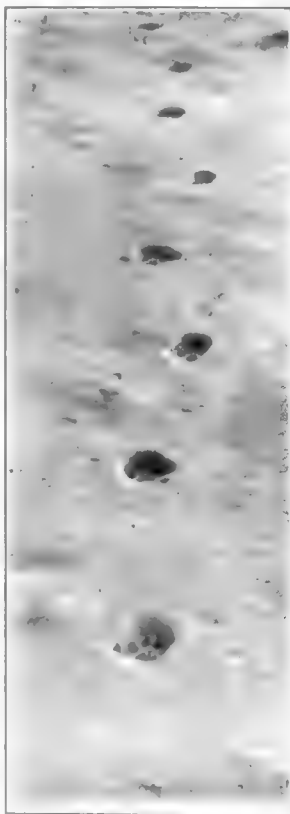
our barns, the goldfinches and waxwings to the maples, the chipping and song sparrows to the hedges, the warblers and vireos to the gardens and our lawns will resound with the music of native birds instead of the chatter and broils of these noisy interlopers.

In addition to the traps described in the U. S. Department of Agriculture Farmers' Bulletin on "The English Sparrow as a Pest," the accompanying photograph shows a net that has been used very successfully from August until November when the sparrows roost in the ivies on the walls of many buildings. It is about twenty feet square, made of cheese cloth. It is raised into place against the wall after the sparrows have gone to roost and when lowered it scrapes them off from their perches to the number of over a hundred at a sweep. Over 500 have been taken from a single roost in one evening.

The starling, introduced into New York City in 1891, is now likewise multiplying and spreading nearly as rapidly as the sparrow. While it is abundant only in the country adjacent to New York City, it has spread to most of New England, New Jersey, Eastern Pennsylvania and New York and the advance guard even to Ohio, so that within ten or fifteen years it will undoubtedly be abundant all over the East. The economic status of this bird is still somewhat undecided, although it is much more insectivorous than the house sparrow. It is very quarrelsome and, nesting in holes in trees, it is rapidly driving out the blue birds, flickers and other hole-nesting species.

BIRD LIFE IN JULY

July is a month of transition. Many species of birds are still nesting while some are already beginning to get ready for their southward journeys. The waxwings and goldfinches are just beginning to build their nests but the majority of species have either completed their family cares or are starting again on a second brood. The swallows and the blackbirds have gathered into flocks, the former congregating on the wires especially along lake shores and the latter assembling in great concourses in the tops of the evergreens and in the marshes.



CAT TRACKS

More abundant in the woods than the tracks of any other birds. Cats should be locked up at night and not allowed to hunt in the woods and fields where they kill countless numbers of birds.

The rainy days of June are at an end and standing pools of water and even springs begin to go dry so that water becomes scarce. The birds now begin to desert the dry hillsides and even the gardens where no water is available, and move down to the borders of streams and moist woodlands. Now is the time to begin putting out water for the birds if you have not already commenced. A bird bath or fountain in the garden will not only retain the birds already there but will draw in many others. If you can have running water, so much

the better, but if not, even a shallow pan in which the water is replenished will be serviceable. It must be less than an inch deep where the birds are to enter and the bottom must not be slippery. The accompanying photograph of the fountain in the garden of Professor and Mrs. J. H. Comstock shows how the bird bath may be made one of the most attractive parts of the grounds. Many species of birds come here to drink and bathe and they add much to the beauty of the garden.

California Forest Fire Protection

BY GEORGE R. RHODES

Secretary, the California Forest Protective Association

WHILE the records for the last three years, as shown by the reports from forest owners and the Federal Forest Service, show that forest fires in California have been steadily decreasing and the damages to timber and cover growth has almost reached the vanishing point, the California Forest Protective Association is continuing its efforts to enlist the cooperation of all interested for further prevention of forest fires.

The reports covering timberlands outside the areas protected under cooperation with the government for the past three years, show a constantly decreasing area burned over with less damage each year, as follows:

1913, 6,330 A. burned over, damage.....	\$1215.00
1914, 1,650 A. burned over, damage.....	750.00
1915, 1,145 A. burned over, damage.....	660.00

The report of the Federal Forest Service for District No. 5, covering California, on cooperative fire protection for 1915, shows that 28 lumber companies, the Southern Pacific Railroad and fire protective associations composed of timber owners, cooperated with the Federal Forest Service in protecting 2,601,138 acres of timberlands from forest fire at a total cost of \$8,832.49, or nearly \$.004 per acre. While inexpensive, this cooperation was effective as is shown by the fact that only 8,016 acres were burned over with a total loss of \$899.75, or 11 cents an acre on the area burned over.

In addition to this cooperative protection the California Forest Protective Association reports show that timber owners expended over \$14,000 for further protection and had 14,036 men available to fight fires in emergencies.

Cooperation with the Federal Forest Service, both by individual forest owners and associations of owners has been so satisfactory in every way that it has been rapidly extended during the past three years and will doubtless be further extended in the future so that practically all of the privately owned timberlands adjacent to the National Forests will be under cooperative protection. This will cover practically all of the pine forests of the State.

The remainder of the California forests are practically all in the redwood belt along the coast where the moist, foggy climate during the summer, the undergrowth of low growing evergreens such as ferns, the thick bark and peculiar qualities which render the redwood almost immune from fire, contribute to conditions which make destructive forest fires in the redwoods almost impossible.

While a very small part of the redwood forests is adjacent to National Forests, and for that reason there is little opportunity for cooperation between the owners and the Federal Forest Service, yet the owners individually and in cooperation with one another, and also through organized associations, carry on a thorough, effective system of protection against forest fires. And this protection extends also to the cut-over lands where the danger from fire is greatest, and which promotes reforestation.

In carrying out encouragement of cooperation for prevention of forest fires, which has been established as a regular work of this Association, a letter was mailed to each of the five members of the Board of Supervisors in the twenty-eight timbered counties. That this was effective in securing the attention and cooperation of the Supervisors is shown by the following quotations from letters received:

"I have your letter of the 15th and note what you say in regard to brush and grass fires, which at times do great damage to the forests. Please be assured that we will always be glad to cooperate with you with these objects in view."

"I wish to acknowledge receipt of your communication of April 15 relative to brush and grass fires. I wish to say that this county will in the future, as it has in the past, through its Board of Supervisors, do all it consistently can in this matter and I will be pleased to bring this matter before our board at its next meeting to this end."

"I have sent all through my district notices as sample enclosed, which we hope will be satisfactory."

The sample mentioned was a notice printed on cloth 10 by 18 inches and worded as follows:

BE CAREFUL
NOT TO THROW AWAY
BURNING MATCHES OR TOBACCO
*Do your best to prevent brush, grass and Forest
Fires and Save Valuable Property.*

At the same time a letter asking for the assistance of the newspapers in giving publicity to forest fire protection work was mailed to newspaper editors throughout the State. That the newspapers gladly assisted in bringing this to the attention of their readers is shown by the fact that articles were published in practically all the papers throughout the State. In addition to this, some of the timber owners contributed articles to the papers in the localities where they were interested, calling attention to local conditions, all of which was most effective.

Perhaps the greatest value of such newspaper publicity arises from the fact that it brings about a better understanding between the people and forest owners in regard to their common interests.

THE PENNSYLVANIA FORESTRY MEETING

THE midsummer meeting of the Pennsylvania Forestry Association at Reading, Pa., June 27-29, was a great success. Not only were the sessions well attended but the papers and addresses were of much practical benefit and the outings at which it was possible to view extensive forest planting on the estates of Jacob Nolde and George T. Horst, as well as the municipal nursery containing 30,000 coniferous seedlings, and the extensive plantings under the direction of the Berks County Conservation Association, were of unusual instructive value to the many foresters, students and lovers of trees and forests attending the meeting.

Officers and members of the American Forestry Association, instructors in forestry from a number of forest schools, forestry students from the Pennsylvania State College and the State Forest Academy at Mont Alto were among the guests, and these, together with the members of the Pennsylvania State Forestry Association and the Berks County Conservation Association, made up a large and enthusiastic party on the several attractive trips which had been arranged. A number who had been present two years previous when the Berks County Association was organized took special interest in seeing the development of its work for conservation and the rapid and substantial growth manifested not alone in tree planting but in the large number of people who have become interested in carrying on the work.

Dr. J. T. Rothrock, president of the Pennsylvania Forestry Association, presided at the meetings, assisted by Dr. Henry Sturgis Drinker, director, and for three years president of the American Forestry Association, and State Forest Commissioner Robert S. Conklin. Addresses were made by Jonathan Mould, president of the Berks County Conservation Association; Dr. Joseph Kalbfus, Pennsylvania State Game Commissioner; James B. Sansom,

of the Wild Life League of Pennsylvania; Harris A. Reynolds, secretary of the Massachusetts Forestry Association; Marion G. Sellers, of the Pennsylvania State Fish and Game Protective Association; N. R. Buller, of the State Department of Fisheries; Samuel J. Waid, of the Boys' High School of Reading; V. A. E. Daecke, of the State Department of Agriculture; Dr. Filibert Roth, of the University of Michigan; Dr. Whitmer Stone, of the Pennsylvania State Audubon Society; Prof. J. A. Ferguson, of the Department of Forestry, State College; and State Foresters Robert S. Conklin, Nelson R. McNaughton and George S. Perry.

Resolutions were passed thanking all who participated in making the meeting a success; congratulating the Berks County Conservation Association and the city of Reading on the conservation work accomplished; expressing appreciation of the work of the Wild Life League, the United Sportsmen, the State Game and Fish Protective Association and the State Sportsmen Association, all of Pennsylvania; expressing pride in the efficient administration of the forestry interests of the State under the able management of the Forestry Department and its experienced head, the Hon. Robert S. Conklin, and earnestly advising against any consolidation of the Departments of Forestry, Fish and Game, and Water—as tending to destroy initiative, and efficient and effective management of each and all of them, and as being against the general experience and judgment of experts in other states.

The resolutions also declared: "We particularly impress on forest lovers the need of immediate attention being given throughout the country to the danger of the spread of the White Pine Blister Rust, a tree plague that is likely to be as devastating and as serious in its results as the Chestnut Blight. The proper time to act is now before the disease has spread."

THE MISTLETOE A FOREST PEST

A RECENT study, conducted by the U. S. Department of Agriculture, of the injury done by mistletoe to coniferous trees in the Northwest indicates that in many regions this is a serious forest problem. The western larch, the western yellow pine, the lodgepole and the Douglas fir suffer the most. Each of these is attacked by a particular species of mistletoe which gradually reduces the leaf surface of the tree and thus causes a great reduction in growth, both in height and in diameter. Excessive mistletoe infection of the lower branches of the tree may cause the upper portion of the crown to die, giving rise to what is commonly called staghead or spiketop. Severe infection throughout the entire crown often results in the death of the tree. Young seedlings from three to six weeks old may be killed within a comparatively short time after they become infected. Furthermore, trees weakened by mistletoe infection are much more susceptible to attacks from fungi and forest-tree insects.

The Columbia Highway in Oregon

BY HENRY L. BOWLBY

Formerly State Highway Engineer of Oregon

THE nation-wide campaign for better roads has been responsible for the construction, during the past five years, of many highways that not only have a local interest but also are of national importance. The continuance of the European war has added an unusual impetus to the building of trunk highways that will enable Americans to "See America First" and at the same time link together neighboring states with a means of communication that will form an important part in any plan for national preparedness.

For the growth of these national highways the Pacific Coast has proven to be the most fertile ground. An immense territory, with few existing roads, it is a paradise for the highway engineer, affording as it does an opportunity to display his ingenuity and to put into practice the best there is in modern highway engineering.

Our Pacific Coast States are separated from the main part of the United States by an almost impassable

barrier. The Cascade Mountain range is unbroken from British Columbia to Mexico, except in three places; the Frazier River on the north in Canada; the Klamath River between Oregon and California; and the Columbia River between Oregon and Washington.

There are several passes which make it possible for the transcontinental railroads to reach the coast during most of the year. Every winter some or all of these railway lines are blocked by snow. The only route to the Pacific ocean that was open every day this past winter was the Columbia River route, and it is along this route that the wonderful Columbia River highway is being built, a highway which is one of the most notable of the scenic attractions of the Pacific Coast.

The great gorge of the Columbia River provides some of the grandest scenery in the world. Its beauties have been portrayed by John Muir, John Burroughs, Joaquin Miller, and many other lovers of the beautiful in nature.



THE FAMOUS VIEW FROM CROWN POINT

Here the road makes an almost perfect circle around the big bluff which overlooks the river. This is a favorite stopping place for the traveler and is perhaps the best viewpoint along the entire route. The river may be seen for a long distance in each direction, and there is a fine view of the country on the north bank of the stream.

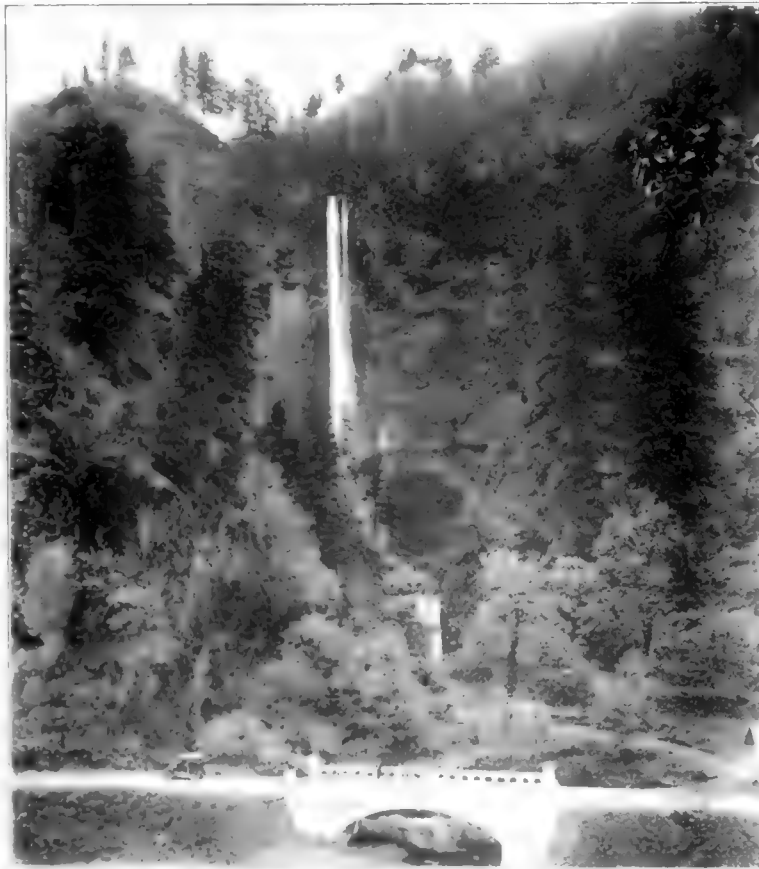


A TYPICAL VIEW

Many such views burst upon as they sweep around the height of this point above railroad which is seen far

The Columbia River canyon is so rugged that no attempt to build a road through it was successful until the project started in 1913. The need of a highway to connect the Oregon seacoast with the broad, fertile acres east of the Cascade Mountains has long been recognized and it was largely due to the foresight and initiative of Mr. Samuel Hill, a past-president of the American Road Builders' Association, that this highway has been constructed.

In 1913 the building of the Columbia Highway on its present magnificent scale was undertaken. The State Highway Department,



MULTNOMAH FALLS

It is one of the most scenic features of the highway. A bridge over the falls is visible in the middle of the picture. A road leads to the falls from the highway just above the falls.

OF THE RIVER

the vision of travelers curves of the highway. The the river is indicated by the below the highway.

which was created the same year, had charge of its location and the engineering of all kinds required in its undertaking. Oregon was the last of the Pacific Coast States to establish a highway department. Hill's influence was felt again in this matter. In February the members of the Oregon Legislature were his guests on a trip by special train to Maryhill, his country estate on the Columbia River. He had built, at his own expense, several miles of modern hard surfaced road near his ranch, costing \$120,000. After listening to an illustrated lecture on roadbuilding by Mr. Hill and

inspecting thoroughly these roads, the Legislature enacted the law providing for a State highway engineer and a system of State roads. The State Highway Commission, thus created, secured the services of the writer as State Highway Engineer, and launched an extensive road-building campaign.

No money was available for the use of the department except \$10,000 set aside for office expenses. A campaign of education was started with the object of inducing the counties to vote bonds to build trunk roads under the direction of the State Commission. The first to take advantage of the new law was Jackson County. On July 3, 1913, this county turned over to the State Highway Department the location and construction of the Pacific Highway in that county, and raised \$500,000 from a bond issue for this purpose. Counties on the Columbia River were the next to feel the effect of the state-wide campaign for good roads. Clatsop, Columbia, Hood River and Multnomah Counties raised altogether \$2,335,000 for the construction of the Columbia Highway. On July 26, 1913, the

Board of County Commissioners of Multnomah County, under the leadership of its chairman, Rufus C. Holman,

appointed an advisory committee to advise them on matters connected with the new departure in modern road building. On September 24 the County Board turned over to the State Highway Department all engineering connected with the Columbia Highway in that county and set aside \$75,000 to the order of the State commission for this purpose. An Assistant State Highway Engineer was placed in charge of each of the different units. S. C. Lancaster was Assistant Highway Engineer in charge of the work in Multnomah County. Surveys were made and construction started in October, 1913. Twenty-two and one-half miles of new road have been completed to date at an approximate cost of one million three hundred thousand dollars. This amount includes the cost of



ANOTHER TUNNEL AND BRIDGE

This is on one of the lower grades of the road, about the same level as the railroad. The character of the rock through which cuttings had to be made is apparent.



THE BOWLBY TUNNEL

Here the rocky side of the mountain overhangs the river and the engineers decided the safest road would be through a tunnel. This was so cut that it is lighted naturally by several openings through which wonderful views of the river far below may be seen.



LATOURELL BRIDGE

In the left center background is seen Crown Point. Note the artistic overhead footbridge spanning the highway. The road is well shaded by the trees along the greater portion of the route.

23 miles east of Astoria, and overlooking the mouth of the Columbia, the highway runs out of a forest of firs at an elevation of 700 feet to descend 650 feet on a 5 per cent grade along the face of the cliff. The descent is accomplished by four wonderful hairpin curves, and yet the road is so located that a long sight line for the autoist is preserved on each curve. This is unquestionably the grandest feature of the lower section of the highway. From the crest an unbroken view is obtained up and down the river for a distance of nearly 40 miles.

Following the river towards Portland the highway passes through Columbia County for 56 miles, along which course the most attractive scenic section will be the Beaver Valley unit,

THE CHARACTER OF THE ROAD

The road is like this along the whole course of the highway, wide with easy grades and graceful curves, a delight for the motorist and with scenic features unsurpassed by any highway in the world.

surveys, grading, building the large reinforced concrete bridges and paving the road with Warrenite pavement for a width of 18 feet.

"Millionaire" Roadmaster John B. Yeon, one of the leading citizens of Multnomah County, gave more than two years of his time free to the public and took active charge of the construction of the roads in his county.

The Columbia Highway in Oregon begins at Seaside, on the Pacific Ocean, in Clatsop County. It parallels the ocean beach for 12 miles and then cuts directly across the marshlands, a distance of 12 miles, to the City of Astoria. From Astoria to the Columbia County line the highway extends 28 miles in this county. On Bugbee Mountain



on which is located the beautiful Beaver Falls.

In Multnomah County the highway has been practically completed and paved for a distance of 44½ miles east from Portland. At a distance of 23 miles from the city, Crown Point is reached. The road here is carried around the top of a rock cliff at an elevation of 750 feet above the river, on a curve of 110-foot radius. The central angle of the curve is 225 degrees. On the outer edge of the road a 7-foot sidewalk has been built and is protected with a concrete railing 4 feet high.

Latourell Falls is passed at 26 miles and Shepperd's Dell at 27.5 miles. Bridal Veil Falls is one mile farther and Gordon Falls or Waukena (most beautiful) Falls in Benson Park are 31.5 miles from Portland. Multnomah Falls, the largest and grandest of the ten waterfalls encountered in this county, are a mile beyond Waukena Falls. A large park of four hundred

Another point of especial interest is the Oneonta Gorge and Tunnel two miles from Multnomah Falls. The highway crosses the stream on a reinforced con-



MCCORD CREEK BRIDGE

Type of artistic construction of bridges along the Columbia River highway which is so in keeping with the wonderful natural scenic features so numerous along the entire route.



THE APPROACH TO A TUNNEL

The difficulty of the construction at a point like this was solved in the manner so vividly indicated by the photograph.

acres, including the best of the falls and the most rugged of the landscape, was purchased and presented to the public as a gift by Mr. S. Benson, of Portland.

crete bridge and passes immediately into a tunnel 125 feet in length. The height of the rock cliff is 205 feet, the railroad is close to the face of the cliff and the river is next to the railroad so that a tunnel was the only solution of the problem.

Horsetail Falls are a few hundred yards farther and 40.0 miles out from Portland the scenic three-hinged arch bridge over Moffet Creek is crossed.

Twenty miles more the Bowlby Tunnel is entered and the city of Hood River is five miles farther east. Pendleton, the home of the "Round-up," is the eastern terminus of the Columbia Highway, distant from Seaside 363 miles. A variation of rainfall of unusual degree is found on this highway. At Astoria, nearly a hundred inches per year is the average; at Portland, forty-two inches; while at Cascade Locks the precipitation is seventy-seven inches; and sixty miles farther east it is fifteen inches per year.

In Hood River County the gorge of the Columbia widens out again above the Cascades, where is to be seen some of the grandest and most rugged scenery in the world. At one point five miles west of Hood River City it was found that the most economical construction would be a tunnel through solid rock for a distance of 400 feet. To have built over the point of rock using the maximum grade of 5 per cent would have required an additional mile of road. The state appropriated \$50,000 to construct this section of the highway, 4,500 feet in length. Topographical condi-

tions were right for a tunnel with windows cut out to the face of the rock cliff. A 200-foot viaduct of reinforced concrete was planned for the west approach. The tunnel portal at this end is short, the highway entering the face of a rocky nose. At the east end the portal excavation is more than 100 feet long. There are five windows in the tunnel, each window being approximately 20 feet long and 19 feet high. The tunnel section is



HORSETAIL FALLS

One of the many beautiful waterfalls along the course of the highway bearing, however, anything but a romantic name, so freely given similar falls.

18 feet wide and 19 feet high. The tunnel required very careful work on the part of the contractor, the specifications providing a bonus for carefulness in excavating the tunnel and window sections. The tunnel cost complete \$14,472.85, its actual length is 390 feet, giving a cost per lineal foot of \$37.10. This tunnel, it is claimed, excels the Axenstrasse on Lake Lucerne in Switzerland. The windows are protected by concrete railings and are recessed to provide ample room for tourists to stand and view the Columbia River a hundred and fifty feet below and the rugged shores of Washington on the opposite side.

Hood River County voted a \$75,000 bond issue which was used in grading six and one-half miles of the highway in places where no road existed. The completion of these sections made it possible to open the Columbia Highway to traffic in August, 1915.

TROPICAL FORESTRY AT YALE

AN important development in forest education is marked by the recent announcement that after the first of next July research and instruction in tropical forestry will become an established part of the work of the Yale School of Forestry. The step is significant both of the importance of tropical forests and of the part which this country may be expected to play in guiding their development.

With the gradual exhaustion of the timber resources of the temperate regions, the growing investment of American capital in the tropics, and the improved sanitation of such countries, tropical forests are unquestionably destined to become of constantly increasing importance. The need for thorough study of tropical forests and for the education of professional foresters for work in the tropics is therefore obvious, particularly when it is remembered that the few schools which now exist in the tropics, particularly in British India and the Philippines, are either local in character or devoted to the training of the lower grades of forest personnel.

Tropical forestry is an almost untouched field. Although tropical forests are vast in extent and one of the foremost resources of tropical regions, comparatively little is known even of their composition and practically nothing as to the best methods of handling them. Their organization, utilization, and development are consequently bound to receive much attention during the next half century. In this the United States should play an important part, particularly in the training of professional foresters upon whom will devolve the important task of developing forestry in the tropics. American forestry methods have already been accepted by several far eastern countries as the type best fitted to their conditions. Foresters trained in this country and with experience in the Philippines have been selected by the English to organize and take charge of forestry work in Borneo, and by the Dutch for similar work in Sumatra; while China has recently appointed a graduate of Yale as forestry adviser and co-director of its forest service.

The action of the University in making instruction in tropical forestry one of the activities of the Yale School of Forestry makes it certain that Yale will play an important part in training men for professional work in the tropics and in helping to formulate the forest policies for tropical regions. No announcement has yet been made regarding the organization of the work in tropical forestry or the personnel under which it will be conducted. Such research and investigation as is undertaken will, however, in all probability be concerned chiefly with tropical dendrology and silviculture; technical properties and uses of tropical forest products; and trade information and methods of forest exploitation. Present plans, it is understood, contemplate making the School of Forestry the center for information on tropical forestry, and particularly on Central and South America.

It is estimated that there is enough waste from the sawmills of the South alone to produce twenty thousand tons of paper a day.

Forestry and the Public Health

BY HENRY REED HOPKINS, M. D.

Former President Medical Society of New York

TO Americans no subject is of more vital importance than that of forestry. Without our forests the fertility of our soil, the profits of our farms and gardens, the building, the operating, the profits of our railroads, the operations of our mines of coal and iron, the building and the maintenance of our homes, our industries, in fact, our civilization disappears, and what the traveler now sees in many parts of the old world in Palestine, Greece, Northern Africa, Northern China, and Central India will be seen on the plains of America.

Our minds may possibly open to a more proper valuation of this matter as we recall the past rapid growth of our population and then forecast that within a couple of centuries, a brief period in the growth of nations, America should be the home of some 500,000,000 of prosperous, free and independent citizens. We know of no facts more potential in our future possibilities than the facts of the relations of forests to climate, to productiveness of soil, to industries, to the prosperity of nations, to civilization.

We now invite earnest consideration of some of the well-known principles and facts upon which the foregoing inferences and conclusions are predicated. During the last twenty years the problems of forestry in our country have been enthusiastically studied, and the literature is rapidly growing in interest and in scientific value. Some acquaintance with this literature prompts us to call attention to the following data, the groundwork of our opinion as to the timeliness and the fundamental importance of our subject.

First, let our minds enjoy the exercise of a biological excursion; let us recall that our forests are the royal family, the princes and the monarchs of that kingdom

which includes all varieties of beautiful plants and flowers, of edible grains and fruits, and that this forest kingdom had possession of the surface of the earth for many millions of years before the appearance upon the earth of man, or of a single specimen of animal life. In fact,

during this long period, forests and their kind were preparing the way for animal life—for man. The thought we would chiefly emphasize is that this long and complicated evolutionary development by forests for man's residence upon the earth was in entire harmony with the laws and vital principles of man's nature and possible progress, and that those same laws and vital principles—man's material environment—are here and in operation today and for all time. Neither should we overlook the important biological fact of man's intimate dependence upon the food, oxygen, without which he lives but a few moments, and also that man in his more important metabolic processes is constantly producing large quantities of carbonic acid, a poisonous gas, the presence of which in a certain proportion in the air makes the same unfit to breathe; and we may recall that our forests exhale vast quantities of oxygen and generously absorb like quantities of carbonic acid.

Let us direct our thoughts for a moment to something possibly more plainly practical, more distinctly economic in its significance; we refer to the distressing phenomenon of many of the rivers of America of breaking out into destructive, devastating floods of increasing frequency and severity. The National Conservation Commission, in its report for 1908 and 1909, gives much space to an interesting discussion of this matter of floods. From this we learn that these disasters are steadily and surely



DR. HENRY REED HOPKINS

Who urges members of the medical profession to study forestry and tells why forestry is closely allied to health.

increasing in duration, in frequency and in severity. For instance, we are told that in the year 1900, the losses from floods was some \$45,000,000. That this loss steadily grew year by year, until in 1908 it was more than \$237,000,000; and we are further told that this annual waste is constantly increasing and will yet increase until care of our forests and reforestation again provides our hills, mountains, and water sheds with that protection which was theirs by nature's provision and which alone prevents floods.

Speaking of water sheds reminds us to call attention to the unusual and interesting topography of the State of New York, the water sheds of which in very fact make it the Empire State. On our northern border from the extreme west to the far east our streams find the way into the Gulf of St. Lawrence; on our eastern slope the Housatonic River empties into the Long Island Sound; the Hudson River into New York Bay; on our southern side the Delaware River into Delaware Bay; the Susquehanna River into Chesapeake Bay; and the Allegheny and Ohio Rivers into the Gulf of Mexico. All of these streams with a southerly direction are subject to more and longer floods; the responsibility of the State of New York is distinctly far-reaching and of wide proportions.

Another destructive feature from want of a proper proportion of forests is denudation—the washing away of the soil itself; the loss from denudation like the loss from floods is enormous every year and these losses are steadily on the increase. The authority last cited gives our yearly loss from denudation as over 270,000,000 tons of dissolved matter and 513,000,000 tons of suspended matter. This total of 783,000,000 tons represents more than 353,000,000 cubic yards of rock substance, or 610,000,000 cubic yards of surface soil. If this erosive action had been concentrated upon the Isthmus of Panama at the time of American occupation, it would have excavated the prism for an eighty-five-foot level canal in about seventy-three days. Space will not permit us to present exhaustively many of the important arguments of this case; the economic value of inland water transportation; the importance of the constant flow of springs and streams; the importance of our large investments for purposes of irrigation; why in so many countries deserts replace civilization; the prevention of droughts and hurricanes; why this matter should have a prominent place in all medical colleges where preventive medicine is properly taught; the proportions of forests to farm lands in various places;

each of these is a subject on which interesting paragraphs or chapters could be written.

The purely economic side of the subject alone makes it a matter of transcendent importance. Add to this the relation of forests to business, to the manufacturer, and the arts of civilized life, and the question becomes second to none in supreme and all-embracing significance. And yet we believe that more intelligent consideration will show that a more important relation of the forests to mankind is biological rather than economic—the exist-

ence of human life, the perfection of mankind, the prevention of disease; this is the more important side of our subject, the side that should and does appeal to medical men and the side which medical men should intelligently, emphatically, and persistently acclaim.

This dogmatic statement is based upon a consideration of the rôle played by forests in the production of climate and the importance of climate—air, light, humidity, and temperature, the environment of man, the factor of supreme importance in man's existence and welfare.

[Note.—After making the above address at the meeting of the Medical Society of the County of Erie, N. Y., Dr. Hopkins presented the resolution accompanying this article.]

RESOLUTION ASKING MEDICAL SOCIETIES TO URGE A STUDY OF FORESTRY

Resolved, That the Medical Society of the County of Erie, State of New York, hereby makes record of its conviction that to Americans the subject of forestry is a matter of enormous vital significance; that to the medical profession of America the subject should appeal as to no other group of our citizens; that record should be made and repeated by medical societies, county, State and National, urging upon those in authority the importance of the most intelligent study of this question of forestry to the end that suitable action by our governments, State and National, be taken in this our most vital problem. And be it

Resolved, That these resolutions be transmitted under the seal of this society to the Medical Society of the State of New York, with the request that the same receive due consideration, and if approved that the matter be brought to the attention of the American Medical Association at its next meeting.

[The above resolution was presented by the Committee on Public Health to the Medical Society of the County of Erie, N. Y., and passed at its last meeting.]

SAVING DAMAGE TO THE FOREST

THE system of forest fire prevention in use in Vermont has now been given sufficient trial to demonstrate its efficiency, and the results are most encouraging. Not only has a smaller percentage of Vermont's forest area been burned over during the past few years than in adjoining States, but the expense of fire fighting has been relatively less.

The law provides that the expense of fighting forest fires is borne by the town in which it occurs, but if in any one year this expense exceeds 5 per cent of the grand list the balance is paid by the State. In the unorganized towns the State bears the whole expense, since the taxes come to the State. In the year 1908, before the establishment of the Forestry Department, the State of Vermont spent \$9,039.32 in this way. During the seven years since the establishment of the department the total cost for this work has been \$5,565.15, or an average of \$795 a year.

Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

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MUNICIPAL PLANTING OF SHADE TREES

IN last month's issue we announced a series of articles on Shade Tree Planting. The first one dealt with planting done by a local community. This month we will consider the advantages of having all street tree planting done by the municipality. It matters little whether the responsibility for the planting and care of street trees is vested in a forester, a department of the city government or in a separate commission, provided the authoritative head has the knowledge and ability, is clothed with sufficient authority and is provided with adequate funds to carry out the work. There really are distinct advantages in having the municipality undertake shade tree planting as against leaving the work to individual or even cooperative effort.

If the city authorities undertake the planting, they can do it uniformly over large areas, they can adhere to one species on the same street, set out the trees at uniform distances apart regardless of individual property lines, and they can have them all of the same size, no matter what the individual desires of the property owners may be. The municipality, planning for a large number of trees at one time, can plant accordingly, select the trees ahead of time, obtain them cheaper than individuals can and possibly grow them in a municipal nursery especially designed for that purpose.

Another advantage of equally great importance lies in the fact that the municipality, in undertaking such work, would be provided with a specially trained man for that purpose. He would be either a representative of the local park department or a city forester with an independent office. In either case, he would be the man who, by virtue of his special training and experience, would be fitted to plan for the work at the proper time, select the trees in the most advantageous manner and see to the detail of planting and after-care. With his

experience and concentrated attention, he would of necessity obtain better results than any layman could.

In establishing a municipal nursery, this man could grow trees at a very small cost to the city. These trees, moreover, growing in close proximity to their permanent locations, would be better suited for transplanting under local conditions, and would avoid the usual losses



A STRIKING COMPARISON

This picture shows the effect of uniform, municipal planting on one side, and spasmodic, individual planting on the other. Pin oaks on the left and maples, etc., on the right at Flushing, N. Y.

resulting from transportation and change of soil and atmospheric conditions, which would, more or less, be the case with trees purchased in other localities.

After the trees have been planted, they must be watered, guarded against mechanical injury, insects and disease, and very often they must be fed. The trained forester representing the city would be better fitted than the individual citizen to know these needs, and apply the necessary cure.

From the foregoing it is evident that the planting of shade trees as a municipal undertaking is the best method, and deserves the careful consideration of all city authorities as well as of others interested in municipal uplift and economic progress. The planting of shade trees

should be classed as one of the most important of civic duties. It matters little how imposing the architecture of a city is, for unless its lines are softened by the foliage of trees, it lacks in artistic beauty and homelike warmth.

From the financial point of view, the planting of shade trees has much merit. Barren, shadeless streets are not attractive to visitors or home-seekers, so that as a busi-



A MUNICIPAL NURSERY

This nursery at Prospect Park, Brooklyn, is now just one year old. It is expected that with the growth of interest in municipal forests and shade tree planting there will before long be many such nurseries throughout the country.

ness proposition unplanted streets may be fairly classed with unsanitary conditions or with any other form of slovenly civic housekeeping. Systematic planting of shade trees in the city greatly enhances the value of contiguous property, and always pays in the long run, whether undertaken by the municipality or by the individual.

In subsequent issues we will consider the organization of a suitable shade tree ordinance and some of the details of planting and care.

MOUNT VERNON'S DEVELOPMENT

A. Oakley Smith, who since last August has been city forester at Mount Vernon, N. Y., has tendered his resignation to the shade tree commission. Mr. Smith, who has been the first man to fill the position created by the common council last summer, will leave it to return to private landscape and forestry with his former employer, Ferruccio Vitale. His services, however, will not be entirely lost to the city of Mount Vernon, as the mayor as soon as he learned of Mr. Smith's resignation appointed him a member of the shade tree

commission. Mr. Smith has accepted the new appointment. In his letter of resignation, Mr. Smith said:

"Active work on our shade trees was commenced last August, and since then some 2,500 trees have received treatment in the form of pruning, trimming, shaping or cavity work. An accurate tree census is gradually being compiled, and when completed will be a very excellent basis for a working plan of the city, giving the number, species and location of young trees, of thrifty, flourishing trees and the ones which are failing; also the number of trees required for planting vacant spaces and unplanted blocks. No planting will be done by the city this spring on account of lack of funds, but next year when the shade tree commission receives a budget, three or four hundred trees will be planted in various parts of the city.

"Development work of this character is naturally slow, and it will take years to show material improvement in the condition of the trees throughout the entire city. Trees planted today will not be valued as shade trees for five or ten years and the result of money spent of necessity in fighting insects is perceptible only to those watching the trees very carefully from year to year. It has been, however, a source of great satisfaction through these past months to note with what interest and keen appreciation the people of Mount Vernon have taken hold of his very vital problem. At first thought some object to the idea of complete municipal control of the trees, but a few moments' discussion is always sufficient to make clear the practicability and importance of this method of protecting and caring for such a valuable asset as the city's shade trees. A number of features are greatly in our favor in connection with this development. Most important of all is the strong support given by the people of every effort put forth to accomplish our object; next is the fact that the insect problem is not as difficult in Mount Vernon as in many other cities. The city is compact, laid out over a relatively small area and the business and residential sections are well defined, thus making possible consistent management and comparatively rapid improvement. The outlook is very promising, and I have every intention of keeping in touch with the development of this department."

ADVICE FOR MANY HERE

One of our members has asked for expert opinion on a number of conditions, and the answers to his questions contain advice of value to many. His questions and the answers are here given:

Q. I have recently purchased a piece of ground along the Susquehanna River, which I intend to convert into a summer home. I desire to transplant some trees, particularly evergreens, and would greatly appreciate it if you would give me such information as you would be able to concerning the following questions: (*We have appended the answer to each question as it occurs, as a more convenient way of presenting the information—*EDITORS.)

Q. 1. Which do you consider the most satisfactory

evergreen shade tree among the evergreens native to this community? My intention is to plant them in groups, possibly of half a dozen or more trees.

A. The white pine is undoubtedly one of the best evergreen trees you can plant in your section of the country. Hemlock is also a highly satisfactory tree for you to plant.

Q. 2. Which do you consider the most fragrant of the evergreens?

A. *Pinus pungens* is extremely fragrant. The balsam fir is very fragrant, but would not do well as far south as your city. I would therefore consider the white pine and the hemlock the best species for you to choose.

Q. 3. Is the balsam pine native to this community? Personally I do not know of it growing here in its wild state.

A. There is a balsam fir which you undoubtedly have in mind. I do not know of the balsam pine. The balsam fir is native to the Adirondack Mountains section, but not in Pennsylvania.

Q. 4. In transplanting these evergreens my intention is to transplant a large tree having a trunk of possibly four to six inches. I have been advised that the proper way to transplant an evergreen of this size is to have the ground dug out around it one season, all of the roots which extend out cut off, and then permitted to stand until the next season so that small roots would form before being transplanted. I had thought of having the trees dug out in midwinter when the ground is frozen about them and transplanted in that way. Could you suggest what is the better plan and what time of the year the evergreen should be transplanted?

A. Your intention to transplant evergreens with a frozen ball is a method that is commonly used with success. The idea of root pruning the tree beforehand is a good one, though it is not always resorted to, and the tree may be transplanted with a large ball without previous root pruning. The root pruning method is the best, however. If you can arrange to transplant these trees in the spring with balls of soil kept intact by means of canvas covers you will do well to do so. You can get an idea of just how this is done by writing to Messrs. Isaac Hicks & Son, of Westbury, L. I., N. Y., for their catalogues and description of their methods. They specialize in this sort of work. The latter method is the best, and spring is the best time to plant evergreens.

Q. 5. What is the best time of year to transplant the tulip poplar, and how?

A. The tulip tree or poplar can best be transplanted in the early spring. The tulip tree should be transplanted with a ball of soil around the roots, and should have its crown cut in at the time of transplanting.

Q. 6. I intend to cover an embankment with honeysuckle vines. Do you not consider this one of the best vines for decorating embankment alongside of road? And what is the best time of year to transplant these vines?

A. Hall's honeysuckle is one of the best vines for ground cover, both on steep banks and in shady places. Early spring is the best time to transplant them. The Virginia creeper and *vinca minor* are equally as desirable. *Rosa winchuriana* makes an excellent ground cover in sunny positions.

Q. 7. Is there any special suggestion you could give me in regard to transplanting of dogwood—as to manner of doing it and time of year? Is there a distinct flowering and unflowering dogwood tree? I intend to transplant some of the ordinary wild dogwood, but have noticed frequently that some trees do not seem to be bearing any flowers.

A. Transplant dogwood in the early spring and cut in the branches at the time of transplanting. Transplant the tree with a ball of soil.

Q. 8. What is the best time of the year to transplant any kind of trees other than evergreens? Is there a time which is most suitable for all, or do different trees require different methods of transplanting and different times of the year for doing it?

A. Generally speaking, spring is the best time for transplanting deciduous trees.

Q. 9. Part of my ground is thickly overgrown with blackberry and raspberry vines. What is the best way to remove these entirely? Can it be done by cutting them down frequently, or must they be dug out in order to eliminate them?

A. Grubbing out blackberry and raspberry vines is the only method of permanently eliminating them from the premises.

Q. 10. I have on my ground a number of chicken-grape vines. Could you tell me whether it is possible to successfully graft on a chicken-grape vine a cultivated grape vine, for example the Concord?

A. A cultivated grape vine can be successfully grafted on a chicken-grape vine (*vitis cordifolia*).

Q. 11. Could you refer me to any particular pamphlets or books giving information on the above inquiries?

A. See Professor Bailey's "Encyclopedia"; Prof. Sargent's "Manual of the Trees of North America"; "Trees in Winter," by Blakeslee and Jarvis, and "Studies of Trees," by J. J. Levison.

THE QUESTION OF SPRAYERS

Many of our members will be interested in the following question and answer:

Q. I wish to purchase a spray to be used for trees. Please give me the names of some reliable concerns, where I could obtain one of small size at the most convenient price. Also please give me all the information you can regarding work to be done this year. My farm is in Central New York.

D. D. D.

A. I believe that the Hays Spraying Machine will answer your purpose best. It is manufactured by the Hays Pump and Planter Company, Galva, Illinois, and

can be obtained from their New York agents, the E. George Company, 194 Front Street, New York City. Two of their machines are especially suited for your purpose. One is a three horsepower machine, catalogue No. 3112, costing \$280, with truck; and the other is a one-and-a-half horsepower machine, catalogue No. 1919, costing \$176.67, with truck. Other good machines are the Fitz Henry Guptil, the Domestic, the Bean, the Gould and the Deyo Macey. You will need oil emulsions to spray the trees in March and Bordeaux mixture and arsenate of lead for later spraying. Interstate Chemical Com-

pany, 12 Bayview Avenue, Jersey City, N. J., will supply those. Other good firms are The Vreeland Chemical Company, 50 Church Street, New York City; Pratt & Co., of the same address; The Graselli Chemical Company and the Sherwin Williams Company, of New York City. You will have to spray your orchard in March with lime sulphur wash and the Bordeaux mixture and arsenate of lead will have to be applied after blossoming. It is wise to have the trees inspected to determine the exact nature of the insects before recommending specific treatments.

QUESTIONS AND ANSWERS

Q. My rhododendrons have died this spring in large numbers. Can you account for it, and tell me what to do?

C. K., *Wilkes-Barre, Pa.*

A. This winter has been a very hard one on rhododendrons and many of the exotic evergreens. We have seen hundreds of rhododendrons winter-killed early this spring; but a close examination will show that they are profusely sprouting from the base and lower branches. All you need to do is to cut off the dead branches and let the new ones come up.

Q. My hickories are dying in large numbers. Can you tell me what to do?

J. M., *Tarrytown, N. Y.*

A. Judging from your statement that your hickories are dying in large numbers, and that they are located in the vicinity of New York, I presume that they have been injured by the hickory bark beetle, an insect which has destroyed thousands of hickories in your vicinity. A close examination of your trees will show sawdust on the outer bark and many beetles ready to emerge on the inner bark. We fear it is too late to cut the infested trees down; but would suggest a careful examination of all the hickory trees during the fall before the leaves drop, and would advise you to mark the infested ones and have them removed and burned before the following spring.

Q. My horse chestnuts are turning brown.

M. L., *Syracuse, N. Y.*

A. It is very characteristic for horse chestnuts to turn brown prematurely. It is due to a fungous blight, and it would be impractical to apply any special form of attention except frequent watering during the hot summer months.

Q. Two of my elms are bleeding profusely, producing a white, slimy flow of sap. Will you kindly tell me what to do?

R. H., *Stamford, Conn.*

A. We assume that your elms are suffering from a disease known as slime flux, caused by little mites. It is very difficult to control this flow of sap, and can only advise you to keep the wound clean, cover the exposed part with coal tar, and if this does not stop the flow of sap, burn out very carefully the exposed area and tar it.

Q. I am sending you two photos of a honey locust of mine that split in two the past winter. As it stands the tree that is left is six feet in circumference. The hole goes well down into the root. Because it is still a handsome tree I am anxious to preserve it and shall greatly appreciate your suggestions.

S. B. S., *Setauket, L. I., N. Y.*

A. Remove all broken parts and by means of chisel and gouge, smooth the exposed wood in such manner as to drain the water and leave no crevices for the accumulation of moisture. After the surface has been smoothed, apply a coat of creosote and another coat of coal tar. It is also necessary to have the edges of the wound cut perfectly smooth, and it would be wise in the fall to trim the top of the crown with the object of lessening the weight of the tree, in order to enable the weakened trunk to support it. A honey locust will respond very readily to severe trimming.

Q. I am sending a couple of twigs taken from a Silver maple. I have several of these on my lawn and they are fairly well covered with these parasites, or whatever they may be, and I would like to know how to treat them, and would be pleased if you could give me a prompt reply. I have also some apple, pear and plum trees and I notice in the crotches of some of the limbs nests of some very small caterpillars. What is the best way to get rid of these?

W. T. T., *Utica, N. Y.*

A. The soft maple leaves show a bad infestation of what we know as the bladder maple gall, a deformity which is sometimes very abundant on small trees, in particular. It is caused by an extremely small plant mite. Ordinarily there is not enough injury to warrant treatment, though should the trees from which your samples were removed appear to justify it, I would suggest spraying in the early spring before the buds have started, with a lime-sulphur wash; any of the standard commercial preparations diluted approximately 1 to 8, such as for San Jose scale. This should prove fairly effective in checking the mites.

As to the caterpillars in the apple and other trees, I assume that they are apple tent caterpillars, and if so, would suggest that you apply kerosene to the webs and caterpillars, early in the morning or late in the afternoon. The kerosene may be applied on a sponge or cloth attached to a stick, and it need not be lighted.

Q. A soft maple tree about fifteen feet high was transplanted two months ago from natural situation in the woods, and was found to contain several decayed spots where branches had been broken off; these were drilled out and filled with cement; the tree leafed out finely, but leaves were attacked by a rust insect; leaves are badly eaten away but still seem vigorous. Shall appreciate your advice.

W. B. C., *Oakmont, Pa.*

A. The answer given to "W. T. T., *Utica, N. Y.*," in the preceding paragraphs doubtless explains the maple rust to which you refer, and the same treatment should apply.

Q. I have had remarkable luck in transplanting about two hundred White pine trees from the woods—they have thrived and some are now about ten years old. They are quite bushy at the bottom and I want to trim those lower branches off, both for protection from fire and to beautify the trees, and would like to know when would be the best time to do this, and also at about what age it would be best for the tree.

C. S. B., *New York.*

A. It is perfectly all right to trim these lower branches at any time from now on, though during the fall would be best of all. Cutting off the lower branches will help to keep out fire and will produce better timber but will not enhance the beauty to any extent. It is best to trim the branches gradually, extending over a period of years rather than doing it all at once. Therefore, the earlier the work is begun, the better.

Q. Could you kindly inform me as to what sort of an insect this is on the elms and what to do for the same? Am sending the leaves in another box.

W. M. S., *Milbrook, N. Y.*

A. The specimens of elm leaves which you send in show they have been eaten by the larvae of the elm leaf beetle. The remedy is to spray the under side of elm leaves at this season with arsenate of lead in solution at the rate of one pound to ten gallons of water. The elm leaf beetle spends its winter in beetle form. In May, the beetles emerge from their winter quarters and feed on the leaves. Their injury results in holes right through the leaves. The beetles then deposit eggs and the larvae soon hatch from these eggs. These larvae, or caterpillars, feed on the under side of the leaves only and produce the lace-like effect shown on the leaves you sent me. In early August the larvae will change into dormant yellowish pupae and in this process they can be found lying about the base of the elm tree in large numbers. All one needs to do at that time is to collect these pupae and destroy them, or pour some hot water on them. Few persons know about this stage of the elm leaf beetle and this means of destroying them is therefore seldom used.

ADVICE ABOUT TREES FOR JULY

This is the month when most of one's attention should be given to spraying for insects, watering and cultivating.

1. Spray fruit trees with Bordo-lead.
2. Spray elms for elm leaf beetle with arsenate of lead, one pound to ten gallons of water.
3. Spray for forest tent caterpillars with arsenate of lead, one pound to ten gallons of water.
4. Spray tussock moth and other leaf-eating insects with arsenate of lead, one pound to ten gallons of water.
5. Examine the under side of beech trees, and if wooly aphid is present, spray with whale oil soap, one pound to ten gallons of water.
6. Examine evergreens, especially prostrate junipers, box, yew, etc., for red spider, and if necessary spray with whale oil soap, one pound to ten gallons of water.
7. Examine sycamore trees for sycamore blight (*gleosporium nervesequum*) which produces a white, woolly mass on the under side of the leaves and causes them to curl and wilt. If this disease is present, spray

with Bordeaux mixture, one pound to eight gallons of water. The disease is now common in the vicinity of New York City.

8. The black locusts are now being injured in the vicinity of New York City by the locust miner, a small beetle feeding on the leaves. Where this insect is present, and where the tree is of special ornamental value, spray with arsenate of lead, one pound to ten gallons of water.

9. Examine the peach trees for leaf curl, and watch all the other trees for some insect infestation, because this is a month when the insects most commonly appear. If you discover something new, unknown to you, write for information.

10. Trim shrubs after flowering. Do not destroy the natural, drooping effects of the shrubs, but confine yourself principally to dead and old wood and superfluous branches.

THE G-TREES OF BILOXI

IN the vicinity of Biloxi, Mississippi, are several groups of pine trees, which, because of their very unusual shape, have been christened G-Trees. Prof. S. M. Tracy, the well-known agrostologist, whose home is on Treasure Point, near Biloxi, discovered these peculiar trees and has described them on several occasions.

The accompanying photograph illustrates the general character of growth. That it is not a freak caused by the breaking over and continued growth towards the light, of an individual tree, is indicated by the fact that there are a considerable number of trees in different groups, all of which have developed the same peculiar shape. The same form is also found in very small trees as well as in larger ones, such as the one shown in the picture. This growth is confined entirely to pine trees and, as far as known, has never been discovered except in the neighborhood of Biloxi. No scientist has been found who is able to explain this freak growth.

RAILROAD IS REFORESTING

A REFORESTATION and tree conservation work was inaugurated by the Chicago, Burlington & Quincy Railroad Company in 1906, at which time 72,000 seedlings were planted on the property of the railroad at Pacific Junction, Iowa. Since that time the number of trees in this grove has been increased and they now number 107,000. The thousands of others have been planted in different sections throughout Illinois, Iowa and Missouri. It has been planned to extend the work into Nebraska, and of the 50,000 seedlings now at Gladstone a large number will be planted in that State. The catalpa tree originally was a native of the Wabash River Valley. It is easy to work and will last from thirty to fifty years when used for posts or in other exposed situations.



A G-TREE OF BILOXI

These Mississippi pines are famous for their peculiar shape, there are a number of them and no scientist has yet been able to explain their freak growth.

The Saman or Rain Tree

WHENEVER there is an unusual drought in the United States, paragraphs go the rounds in a number of papers describing a most wonderful tree growing in the forests of Peru that is said to possess the remarkable property of absorbing the moisture from the air and subsequently pouring it forth from its leaves and branches in the form of rain. Other stories have it that during the day the tree takes up a great deal of water from the earth by means of the roots, and that during the night it is again given off profusely through

Federal and State governments that the experiment of the culture of this remarkable tree in the more arid parts of the country should be conducted with a view to the benefit of agriculture.

It is truly remarkable what a number of credulous people who have read such exaggerated statements about the water-transpiring qualities of the so-called Peruvian rain tree have conceived the idea that it would be a suitable tree to plant in the arid Southwest, where droughts are so common. It is true that the rain tree grows in



Courtesy of the Pan-American Union.

A PICTURESQUE SAMAN TREE (ALSO CALLED THE RAIN TREE) GROWING IN TRINIDAD, BRITISH WEST INDIES

This is the tree which popular fancy believes has the faculty of absorbing moisture from the air and subsequently pouring it forth from its leaves and branches in the form of rain. It is a magnificent tree, grows rapidly, and is indifferent to soil, thriving from sea level to 2,000 feet elevation, and accommodating itself to dry as well as wet locations. In Trinidad it reaches a height of over 80 feet, with wide-spreading branches covering an area of 150 feet in diameter.

the leaves in drops of rain, says the *Pan-American Union*. Some of the numerous stories which have been written and published about this tree state that travelers in tropical America never pitch their tents under it on account of the profuse dripping of water transpired by the leaves during the night in such quantities that in many cases the surrounding soil is converted into a veritable bog. It is said to possess this singular power to a much greater degree during the hot, dry weather, when the rivers are at their lowest and the water most scarce. Accounts similar to these are doubtless familiar to many. The appearance of such articles in the papers is soon followed by a number of recommendations and suggestions to the

semiarid conditions in certain parts of Colombia and Peru, but this does not argue that it would grow in New Mexico and Arizona and that it would supply moisture enough to grow crops in the vicinity of such plantations. The truth of the matter is that this tree does not transpire any more water than other trees with similar leaf surfaces. It is difficult to say how this legend ever originated. Some venture the conjecture that it may have arisen from the fact that the crown of the rain tree is open and the sun always shines through it to the ground, so that the grass and some farm crops grow underneath it almost as freely as in the open. This is a fact which does not obtain in the case of other tropical trees.

A very interesting and plausible explanation of this legend was published by Mr. W. T. Thiselton Dyer in *Nature* of February 28, 1878, when he stated on the authority of Dr. Spruce, the celebrated botanist, who spent many years in South America, that the tamiacaspi, as it is called by the Indians in eastern Peru, is not a myth, but a fact, although not exactly in the way popular rumor has presented it. He said that an examination of the tree from which water is noticed to drop shows a multitude of cicades sucking the juices from the ultimate twigs and leaves and squirting forth slender streams of limpid fluid. This is, however, a rare occurrence, and is not confined to the rain tree, but is true also of the cabbage tree *Andria inermis* and a good many other leguminous trees in tropical South America.

Aside from this legend, the tree is an interesting one from other points of view. There is no other tree in tropical America about which there is so much curious information as the rain tree, and everyone who visits the region of its growth alludes to it as one of the most wonderful trees. It is a very conspicuous feature of the tropical American landscape. One of its chief characteristics is the extraordinary large size of its crown, which often covers fully half an acre of ground. Another feature which distinguishes it from practically every one of its associates is that it has all its leaves on the small twigs at the extreme ends of the branches. All the leaves are thus exposed to the direct rays of the sun.

To the traveler in the northern part of South America, saman is the most familiar name for this tree, and to the general reader it is known chiefly as the Peruvian rain tree. Botanists call it *Pithecolobium saman*. The English-speaking people of tropical America call it also South American acacia, zamang tree, giant thibet-tree, or genisaro. In Martinique it is known as arbre a la pluie, in Dutch Guiana as regenboom, and in Brazil as arvore

de chuva. The tree is widely distributed throughout the tropical part of the world, and a great many other local names have been given to it in different regions of its growth. It is found naturally in Colombia, Venezuela, the Guianas, Brazil, and Trinidad, but its artificial range has been extended to all the islands of the West Indies, where it now forms in many parts a very important part of the tree flora. In Jamaica it constitutes a useful fodder plant. In fact, it may seem strange to say that cattle have been the means of introducing the saman tree into Jamaica. This island was formerly dependent for cattle upon Venezuela, and the food of the animals during their voyage consisted, among other things, of the pulpy legumes of the saman tree. The seeds, being hard, were uninjured by the process of mastication and digestion. The seeds were dejected by the animals in the pastures, where they germinated and grew up into large trees. The process of passing through the animals softened the seeds and hastened the period of germination. In this instance we have cattle as not only the means of introducing the seeds of this valuable tree, but also involuntarily instrumental in establishing the tree in a new country. One acquainted with the saman tree can easily realize its value as a shade and food tree for cattle.

This familiar tropical tree stands pre-eminent as a shade tree for general purposes, and especially for public roads. It grows rapidly and is indifferent as to soil, thriving from sea level to 2,000 feet elevation, and accommodating itself to dry as well as to wet locations. In Trinidad it reaches a height of over 80 feet, with wide-spreading branches covering an area of 150 feet in diameter. The wood is moderately heavy and about equal to sabcu, a closely related tree growing in the West Indies. It is suitable for building purposes and for making furniture and cabinet work.

A CHANCE TO HELP BIRDS, TREES AND PARKS

HOW THE BIRDS HELP THE TREES

1. Caterpillars, beetles, borers and sucking insects are destroying our trees and shrubs. From 76 per cent of the food of the blue bird, 90 per cent of the food of the oriole to 98 per cent of the food of the wren, consists of injurious insects.

2. A pair of scarlet tanagers, working one hour a day for a week will devour 14,000 caterpillars and thus save the foliage of two average trees.

3. The chickadee eats insects and spiders' eggs in the summer; weed seed in the winter. One chickadee will devour on an average 30 canker worm moths a day from the 20th of March to the 15th of April. If the average number of eggs laid by one female is 185, one chickadee would thus destroy in one day 5,550 eggs; and in the 25 days in which the canker worm moths crawl up the trees, a chickadee would destroy 138,750 eggs.

4. Sparrows, finches, doves destroy millions of tons of weed seed. In Utah, the tree sparrows destroy 815 tons of weed seed in a season.

5. A pair of native sparrows will destroy 3,360 caterpillars per week for the family supply. They have been reported to have carried to the nest 500 insects in an hour.

HOW THE PARK DEPARTMENT HELPS THE BIRDS

1. Trees and shrubs furnishing food for the birds have been planted in large numbers.

2. The habits of useful birds have been studied and suitable houses and feeding stations have been put up for them. The boys of the Manual Training High School are making some of these bird houses.

3. Grain, suet, and other food for birds are placed at their disposal.

4. The enemies of birds, such as cats and English sparrows, are kept out of the parks so far as possible.

HOW YOU CAN HELP THE BIRDS, THE TREES AND THE PARK DEPARTMENT

1. You can help to preserve the shrubs and trees upon which the birds feed.

2. You can help to preserve the bird houses and feeding stations.

3. You can donate bird houses, suet boxes and feeding stations, and can encourage the city tree-planting movement.

[This is a copy of a placard prepared by the Brooklyn Park Department for an exhibit.]

Forestry for Boys and Girls

by Bristow Adams

FORESTS AND FISHING

THE boys and I went fishing a few days ago. We really started to work in the garden, but the worms which we dug up were so good and plump that they had much to do with calling us away from the job. It was a pretty hot day anyhow, and we knew it would be more pleasant in the shade of the hemlocks and ash trees along the creek than it was in the unshaded garden.

A convenient tin can soon held a plentiful supply of angle worms, and it wasn't long before we gathered together hooks and lines and started off. Fortunately our house is not far from the creek, which flows through a deep gorge not more than a stone's throw away. Just above and just below us the water tumbles over the rocks in beautiful falls, and the sound of these is constantly in our ears. Of course, we are used to it, but when other folks come to visit us, and especially when they are so good as to stay over night, the sound of the falls makes them think that it has been raining all night long, and they are surprised in the morning when everything is bright and dry.

Not far above us there is a dam which makes a fair-sized lake or pond, and just above this the water runs still and deep. Here we can clamber down to the creek, bait our lines, and if we are lucky can catch enough bass for dinner.

It was not long before we had our lines in, and were waiting with as much patience as we could muster for the much-desired "bites." It was very cool and quiet where we were. We could look over to the State road and see the farm teams creeping past and automobiles

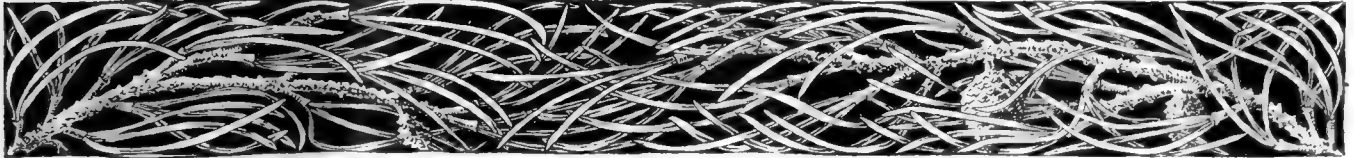
whizzing along, leaving trails of heat and dust behind them. We thought we were a great deal better off than they were, and we had ceased to worry about the garden.

Pretty soon the oldest boy got a bite, but he was not quick enough to hook the fish, and he rebaited his hook and set himself to waiting again. We then got to talking about fish and how long they lived, and whether they could hear, and how they could breathe under water; so, of course, I had to tell them the best I knew about it.

Then we got to talking about the effect of forests on the life of the fishes, and how the very best and gamiest of our inland water fish must have cool, clear water; how trout that once thrived in streams, which were shaded over by the trees, disappeared when the trees were cut away and the streams were left open to the sunlight. Not only that, but the roots of the trees form a filter which lets the rain fall through gently without washing in any fine particles of silt to make the stream muddy. For the brook trout thrives best only in clear water which runs over pebbly bottoms rather than over mud.

From that we got to talking about the use of forests to the fish, and we saw how the fishing was best where the forest was protected, and how forest fires had destroyed many fine fishing streams, and how even the anglers, who cut away the willows and brush from the banks of little streams in order that their lines and fishing flies would not get tangled, had really brought about a greater harm by opening up the streams to full sunlight and taking away the coolness of the water.





The boys got me to talking about the trout fishing in the upper Pecos River, where it rises in the northern part of New Mexico in the midst of the Pecos National Forest; of fishing in the streams of the middle part region of Colorado where the State helps to protect the fish and will not allow lumber driving, which digs up and tears out the streams beds; and best of all, of the "Dolly Varden" and rainbow trout in the McCloud River in California where it flows down from the glaciers on the side of Mount Shasta. I told them how the Dolly Varden would not rise to the fly, but how it fought when once hooked with a bait of salmon eggs, for it has cannibal tendencies. The rainbow trout readily rises to the fly, but it is easier to land.

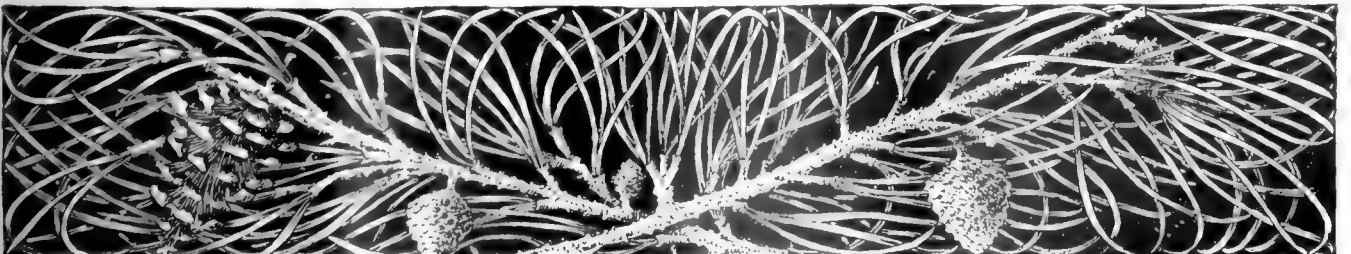
ABOUT this time the smallest boy brought in a bass, and then there arose a dispute as to who should measure him, for according to the State law those which are not up to standard length have to be put back. One of the boys claimed that because he caught it, it was his right to measure it. The other one used the same asis for his argument that since he hadn't caught it, he ought to measure it. After it was settled by having one hold the bass while the other held the little steel folding rule, the bass was found to be too short and was put back in the water, diving down with what the youngest said was a last "wink" with his tail.

For a long time there were no more bites until finally I got a fish, which was of legal age and size. We counted on taking him home in triumph. But it was like the largest fish which always gets away, only it got away in a new and unexpected manner. We were keeping it alive in a large pail to show to mother and

sisters at home, and I had just spoken of the fact that the sun was getting low, and that it must surely be near supper time, when the youngest went to the edge of the water and poured fish-and-all into the stream. His explanation seemed perfectly good, to him at least, for he said that he had put it back so the oldest could catch one; that he and father had each had a chance.

Needless to say, nobody caught any more, and we went home empty-handed and were met with jeers at being such poor fishermen, and with the further very true statement that if we had stayed home we would at least have had the garden all dug up.

YET I felt that the time had not been lost after all; that we had learned how the fish were dependent on the forests for pure, clear water and right living conditions. We had reviewed all of the ways that injury to the forests had hurt the fish. At one extreme, for example, are the terribly devastating fires like the great Miramichi fire of 1825 in New Brunswick, which burned along eighty miles of the Miramichi River in a belt that was twenty-five-miles wide. Those who saw the place afterwards said that the fish were found dead in heaps on the river banks. At the other extreme, possibly, is the cutting away of the brush from the banks and headwaters of the little trout brooks by those fishermen who think only of their comfort for the present, and not of the good of the fisherman who may be there after them. We had spoken of how impurities which came into the streams from factories and cities destroyed all except the poorest sorts of fish; and we realized one more way in which forests may be useful to man and may help in his pleasure and recreation.



County, City, Town and School Forests

By J. W. TOUMEY *Director of the Yale Forest School*

ALTHOUGH the public ownership of forests by the nation and State are the most prominent features in our forest policy, the ownership of forest property by lesser governmental units is becoming important. County forests, city forests, town forests, school forests and the like seem novel to most of us, yet this kind of forest ownership is wonderfully successful and is the dominant ownership in some countries of Europe. Thus in Switzerland about 72 per cent of the total area of the forests of the republic is owned by these lesser governmental units and is known as communal forests. A considerable percentage of the forests of Germany and Austria are of the same kind. In fact, all the countries of Europe have these three classes of public forests, namely, national, State and communal, but in different amounts and in varying proportions.

Almost unknown to the general public and for the most part within comparatively recent years, counties, cities and towns in the United States have been acquiring land through purchase or gift, which must be regarded as communal forests. Although these areas have been acquired for the most part for the purpose of protecting the watersheds from which potable water is obtained or for purposes of recreation, sometime timber reproduction will join hands with water protection and recreation. They are located near centers of population where intensive forest management is possible. Our so-called woodland parks, some of which are 1,000 acres or more in extent should be recognized as county, city or town forests and developed from the point of view of aesthetics and wood production combined, as is now the case with similar forests in Europe.

Without exception publicly owned watersheds protecting potable water supplies should be recognized also as county, city or town forests, as the case may be. Their organization for the production of forest products, is the only important economic use which the land can serve. Accepting this viewpoint, which it seems to me is the only sound one, let us inquire into the present situation relating to them in this country.

The available data for an inquiry of this nature is very fragmentary. Almost unknown to the public, however, and without propaganda to stimulate public opinion favorable to communal forests, the acquiring of lands for such purposes has gone forward with considerable rapidity, particularly in the most populous and the older settled parts of the country. Within the past year I have attempted to gather what information I could regarding forest property owned by these lesser governmental units, which under our interpretation may be called communal forests. The data regarding some States

is fairly complete, while regarding others it is extremely fragmentary. The following table represents the conditions in several States from which I have been able to obtain fairly reliable data. Conditions which parallel these very likely prevail in other States, even in the States listed regarding which the data is not complete.

State	Location	Character	Area in acres	
Connecticut	Bethel	Watershed forest..	125	
	Bridgeport	Woodland park...	50	
	Danbury	Watershed forest..	75	
	Hartford	Woodland park...	413	
	Hartford	Watershed forest..	4,345	
	Meriden	Woodland park...	1,000	
	Middletown	Watershed forest..	684	
	New Britain	Watershed forest..	2,713	
	New Haven	Woodland park...	550	
	Norwich	Watershed forest..	369	
	Wallingford	Watershed forest..	497	
	Waterbury	Watershed forest..	1,000	
	Waterbury	Woodland park...	70	
	Winsted	Watershed forest..	250	
Massachusetts	Boston	Watershed forest..	1,000	
	Milford		150	
	North Adams		800	
	Pittsfield		1,600	
	Pitchburg		600	
	Holyoke		2,000	
	Westfield		1,200	
	Fall River		3,000	
	New Jersey	Atlantic City	Watershed forest..	2,000
		Bridgeton	Woodland park...	250
East Orange		Watershed forest..	800	
Park Com.		Woodland park...	3,365	
Newark		Watershed forest..	22,851	
Asheville		Watershed forest..	17,000	
Bryson City		Watershed forest..	196	
North Carolina	Brevard	Watershed forest..	216	
	Canton	Watershed forest..	220	
	Lenoir	Watershed forest..	240	
	Marion	Watershed forest..	628	
	Murphy	Watershed forest..	600	
	Saluda	Watershed forest..	130	
	Tryon	Watershed forest..	660	
	Waynesville	Watershed forest..	900	
	Weaverville	Watershed forest..	330	
	Winston-Salem	Watershed forest..	600	
Maryland	Baltimore	Watershed forest..	3,000	
	San Diego	Watershed forest..	7,000	
California	Cincinnati	Watershed forest..	1,500	
Ohio	Cleveland	Forest, a part of municipal farm..	100	
	Oberlin	Woodland park...	100	
Utah	Ogden	Watershed forest	2,155	
	Manti	Watershed forest..	1,900	
	Salt Lake City	Watershed forest..	25,000	
Virginia	Lynchburg	Watershed forest..	7,000	
	Staunton	Watershed forest..	5,000	
New Hampshire	Newington	Town forest.....	200	
	Keene	Town forest.....	1,800	
	Manchester	Watershed	1,800	
	Franklin	Town forest.....	155	
	Concord	Watershed	400	
	Newbury		250	
	Nashua		50	
	Littleton		40	
	Hanover and Dartmouth College..		1,060	
	Easton		100	
	Milan		100	
Richmond		100		
Jeffrey		500		
Gilsum		76		

This partial list of the woodland parks, forests protecting the potable water supply, and other areas of potential forest land owned and managed by small governmental units in ten States gives a total area of over 130,000 acres. Although their organization for the production of forest products has scarcely begun, their location near large centers of population where all classes of forest products are high makes intensive forest management possible. I believe we can look forward to the growing importance of these forests not only for the protection which they afford and their use for recreation but also for production of timber. It is my belief that when complete data of all the communal forests in this country are available there will be over 250,000 acres. The following brief descriptions are taken from information received through correspondence.

Hartford, Conn., owns 4,345 acres of watershed forests which protect her potable water supply. A working plan has been made for the property and systematic planting has been in progress during the past fifteen years. Improvement thinnings have been made and considerable mature and diseased hardwoods removed. Good roads have been constructed and other work accomplished looking towards the orderly development of the property for the production of timber as well as for purposes of protection and recreation.

Cincinnati, Ohio, owns a municipal forest of 1,500 acres, which consists chiefly of old fields with pronounced topographic features. At present it comprises an aggregation of farms of which about 25 per cent is in forest, mostly culled or severely injured by grazing. These forests are being managed as selection forests since the growth is largely all-aged classes. Reforestation has been begun and will play an important rôle in the development of the property since 75 per cent is open or denuded land. During the past two years approximately 150 acres have been reforested. The object of municipal ownership and management is for the protection of potable water supply, for recreation purposes, and for the production of wood.

Oberlin, Ohio, owns 110 acres. The area now covered with timber is managed as a selection forest. Reforestation of the open fields was begun ten years ago.

Lynchburg, Va., owns about 7,000 acres of land situated northwest of the city in the Blue Ridge. The city keeps one man employed there constantly and another at times to guard against trespass and fire. The city has not as yet attempted any planting or improvement cutting.

Staunton, Va., owns about 5,000 acres of mountain land, from which it obtains its water. The property is situated south of the city on the northwest slope of the Blue Ridge. It is mostly cut-over land and no attempt has yet been made to improve it.

The city of Newark, N. J., owns approximately 22,851 acres on the upper waters of the Pequannock in Morris and Passaic counties. A large part of the tract is farm land which has been depopulated to prevent contamination of the water. Six or seven years ago some plantations were made under the direction of the State forester

and at various times since some young trees have been planted. It is probable that this tract will ultimately become forested, but little has as yet been done looking toward its orderly development for the production of forest crops.

Essex County Park Commission, New Jersey, owns 3,365 acres, of which 2,050 acres are forested with hardwoods. Improvement thinnings are made from time to time, though chiefly with the view to scenic effects.

East Orange, N. J., owns 800 acres. About 400 acres are forests, and planting is in progress upon about 200 acres. A forest nursery is maintained, also some improvement fellings are carried on in the older stands.

Atlantic City, N. J., owns about 2,000 acres in Atlantic County, but the property is scarcely accorded fire protection.

Asheville, N. C., owns 1,700 acres, which embrace the entire watershed from which the potable water supply is obtained. It is patrolled to prevent fire and trespass, and is fenced to exclude cattle. A well-constructed fire line surrounds about half of the property.

Bryson City, N. C., owns 196 acres mostly forested. It has a watchman to prevent fire and trespass, but the forest has not been organized for forest production.

Marion, N. C., owns 628 acres. It is patrolled to prevent fire and trespass and a fire line entirely surrounds it. It has recently been fenced to exclude cattle.

Newington, N. H., owns a tract of 200 acres, most of which carries a dense pine stand which varies in age from 20 to 60 years. A few years ago it became necessary to make some town improvements. On a patch of six acres in the town forest an older growth of pine was sold for \$2,000, which made the necessary improvements without increasing taxes. Plans are now under way to plant the cut-over land and to survey and map the growth, dividing it into age classes and forming a systematic plan of cutting and reforestation. Eight thousand pine trees were planted in 1914.

The city of Manchester, N. H., owns 1,800 acres, which protects its water supply. Rapid progress is being made in the removal of oaks and gray birch that are subject to damage by the gypsy moth and in planting the open land with pine. During the years 1914-15, 15,000 pines were set out.

The city of Concord, N. H., owns about 400 acres for water protection. In 1914, 50 acres of land, badly infested with gypsy moth were lumbered, bringing to the city a revenue of over \$4,000. The brush on this lumbered area was burned and reforestation established. So far 87,000 pines have been planted.

The above have been selected from a large number of brief descriptions because they fairly well represent the point of view that different communities hold in regard to their forest property and the increasing recognition of the value of these lands for the production of timber without in any way lessening their importance for protection purposes and for purposes of recreation.

The Conservation Congress and National Forest Conservation

A reply by Ex-President Henry Sturgis Drinker to President Pack's article on this subject in the June number of AMERICAN FORESTRY.

TO the Editor of AMERICAN FORESTRY:
I recently received from our esteemed President, Mr. Charles Lathrop Pack, a letter under date of June 12, in which he said: "You have seen my article in regard to the national forests from the national point of view, in the June number of AMERICAN FORESTRY. I think it would be a good idea if you felt that you could publish something in the next number; and I am sure that Mr. Ridsdale would be glad to afford you an opportunity."

I had not seen Mr. Pack's article at the time I received his above letter. The June number of AMERICAN FORESTRY was not then out. I wish I had seen the article before its publication so that I might have placed at Mr. Pack's service the information on the same matter, that, pursuant to his request, I now place at the disposal of AMERICAN FORESTRY. After seeing Mr. Pack's article I wrote him that I would act on his suggestion, and in replying he wrote me (June 22), "I hope you will write an article for AMERICAN FORESTRY as you have indicated. It ought to be of help to the good cause," and this article is published only after its submission to Mr. Pack, and as the result of my conference with him.

Mr. Pack's article in June FORESTRY was apparently based on a feeling that the resolution on public lands quoted by him from the resolutions adopted by the recent conference of the Conservation Congress held in Washington May 2 to 4, was, as Mr. Pack expressed it, "diametrically opposed to the policy of National Forests, and in favor of their dissolution." This is a misconception. The resolution does not refer in words, nor was it intended by the Committee on Resolutions to refer by implication, in any way, to the National Forests.

It is in fact merely a repetition of the resolution in the same words recommended by the Resolutions Committee of the Conservation Congress held at Washington in November, 1913, of which committee Capt. J. B. White, ex-president of the Congress, was chairman, and was adopted with the other resolutions of that Congress at its final session held November 20, 1913, and published with the other resolutions of that Congress, after its adjournment. That it was the same resolution is shown by the following from the records:

Resolution on Lands as adopted by the Fifth National Conservation Congress in November, 1913.

"That the established, traditional, and sound policy of the

Resolution on Lands as adopted by the recent Conference of the National Conservation Congress on May 4, 1916.

"The established, traditional, and sound policy of the

United States with respect to the disposition of its unappropriated public lands is opposed to the making of a direct revenue thereby beyond the expense incident to the surveying, classification and disposing of such lands, but on the contrary that said policy is intended to encourage and promote the settlement and development thereof, and that any act of Congress, or any administrative construction thereof, which is not in harmony with this policy, does an injustice to the new States by placing them on an unequal footing with the original States and by discouraging and preventing the settlement of such new States and the development of their resources."

United States with respect to the disposition of its unappropriated public lands is opposed to the making of a direct revenue thereby beyond the expense incident to the surveying, classification and disposing of such lands; on the contrary, said policy is intended to encourage and promote the settlement and development thereof, and any act of Congress, or any administrative construction thereof, which is not in harmony with this policy, does an injustice to the new States by placing them on an unequal footing with the original States and by discouraging and preventing the settlement of such new States and the development of their resources."

It will be seen that the resolutions are identical. A careful reading of this resolution shows that it contains no reference to the National Forests, which have been duly "appropriated" and set aside by the Government as such. The resolution relates wholly and in specific terms only to "unappropriated" public lands of the United States, and was intended, as it says, solely to endorse a policy to encourage the settlement and development of such unappropriated or unseated lands.

The resolutions on our "Public Lands" adopted by the Conservation Conference at Washington in May last were offered by Samuel Herrick, Esq., a delegate to the Conference or Congress of May, 1916, from South Dakota. Mr. Herrick was also a delegate from South Dakota to the Congress of November, 1913.

He was a member of the Committee on Resolutions of both Congresses, and at that of 1913, he was appointed by Capt. J. B. White, chairman of the Committee on Resolutions, a member of the Subcommittee on Lands, of which subcommittee the late Henry C. Wallace, past president of the Conservation Congress, was chairman. Mr. Herrick prepared the resolution in question, and he states that it was adopted in 1913 by the subcommittee, and subsequently by the full Committee on Resolutions, of which a large number were foresters, without dissent, and the record shows that it was adopted by the Congress on its presentation with the other resolutions at the final session of the Congress of 1913. Mr. Herrick offered this resolution anew in the Committee on Resolutions of the Conference of the Conservation Congress held in May last, deeming it well to have it reaffirmed, just as the resolution recommending the taxation of growing

timber at the yield time, adopted in the resolutions of the Conservation Congresses of 1912 and 1913 was reaffirmed in the resolutions of this year. This resolution on lands was unanimously adopted by the Committee on Resolutions, and as chairman of that committee I can certify that no one in the committee had any idea that it could be in any sense taken as referring in the remotest degree to the National Forests or to the past or present policy in regard to them.

May I add that my own record of work for forestry in the past three years, during which I have been honored with the presidency of the American Forestry Association, and my interest in and work in promotion of the National Conservation Congress, of which I am vice-president and a member of the executive committee, warrant me, as chairman of the Committee on Resolutions of the conference of the Congress recently held, in contributing this clearing up of any misconception of this resolution.

If there is anything objectionable in the resolution, it is interesting to bear in mind that it was formulated in 1913 in a subcommittee of which Mr. Henry C. Wallace, ex-president of the Congress, was chairman—was presented to that Congress by the Committee on Resolutions, of which Capt. J. B. White, ex-president of the Congress, was chairman, and was adopted at that Congress at its final meeting and has stood as an expression of opinion by the Congress on a proper policy on the untaken lands of the nation, for three years.

I have had the privilege and the pleasure of attending the successive meetings of the Conservation Congress at Kansas City in 1911, Indianapolis in 1912, Washington in 1913, and Washington in 1916. At no Congress have I seen forestry interests more sympathetically considered and supported. The admirable report of the Committee on Forests at the recent conference was received with appreciation and approval, as were the other valuable reports on various subjects. Approval was given to them all. It was the distinct understanding of the members of the Resolutions Committee that these reports having been presented to the Congress and received with approval, together with the resolutions recommended in them, by the Congress, did not call for further action by the Resolutions Committee, and that committee therefore addressed its work wholly to formulating and presenting in final form the resolutions submitted to it which had not been the subject of committee reports, and which had not been already acted on by the Congress.

HENRY STURGIS DRINKER.

PRESIDENT PACK'S STATEMENT

MY article in the June number of AMERICAN FORESTRY was written to express our belief in the National Forest Conservation policy, particularly as to the National Forests. The fact that similar resolutions, as explained by Dr. Drinker, were passed at more than one meeting, does not change these principles.

Two wrongs do not make a right. That it was well to plainly express our faith in the National Conservation policy at this time is shown by the large number of letters and messages of approval which I have received.

I feel assured I voice the feeling of the great body of our citizens interested in the faithful conservation and use of our National Forests in expressing the regret that we have not been assured that the Resolutions Committee of the Washington conference believed in the national policy of administering these great assets held in trust for the people.

CHARLES LATHROP PACK,
President American Forestry Association.

FOREST FIRE PROTECTION

WISCONSIN has had no destructive forest fires since 1911; but when we seem most secure is time to take the most effective defensive measures. Four years of immunity should be a warning of danger. Every man in the service of the Wisconsin Conservation Commission is called on now to prepare for a warfare against forest fires the coming season. From April until the fall of snow in November or December, the strictest watch must be maintained; every smouldering spark must be extinguished, and every man going into the woods must find a fire warning staring him in the face from trees on trails and around lakes frequented by campers and fishermen and hunters."

This was the substance of a warning service by Commissioner F. B. Moody, of the Wisconsin forestry force at a conference of all men of the department, held at forestry headquarters at Trout Lake. Prevention of forest fires and all subjects in connection with forestry and forest fire conditions were discussed in a series of nineteen papers, which were followed by expressions of the views of the experienced men of the service.

F. G. Wilson, who is located on the Devils Lake reserve, said that the entire campaign for forest protection was threshed out at the two days' conference. Results of forest fires, cause of forest fires, railroad fire tower's value to the fire elimination problem, and a general plan of fire protection for the State, were the questions that came up, in addition to the general topic of State forestry and handing State reserve lands.

"The forestry department will send out thousands of cards giving advice to summer resort people, campers, fishermen and hunters, in regard to fire protection," said Mr. Wilson. "The old plan of quoting the law will be abandoned, and instead the department in terse terms will ask cooperation in preventing fires—in extinguishing matches before throwing them away,—and especially in putting out fires before leaving a camp. The great slogan will be, 'One tree will make a million matches, and one match will destroy a million trees.'"

BOOKS FREE TO MEMBERS

Members of the American Forestry Association are offered books on trees, birds and flowers, without charge, for securing new members. See offer beneath Table of Contents.

The Lumber Supply of the World

IN figuring future lumber prices, it must be remembered that all quotations up to this date are directly dependent on additions to the producing districts of new primeval forests, from which the demands were filled by lumber until then valueless and therefore cheap in the first stages of export," says an article on "The Conditions and the Future of Swedish Forests," by Prof. Gunnar Anderson, in the popular magazine, *Skogen* (The Forest), from which is here reprinted the following interesting statement about the world's lumber supply: "As long as the steadily increasing demands for lumber can be filled by continuously opening up new primeval forest land, it cannot be expected that lumber prices will reach the height required by normal producing conditions, that is, to yield a proper profit relative to the value of the land, and the costs of production. The great question for the Swedish forestry industry, therefore, is: Are the primeval forests, accessible in the world, soon to be used up, or when will they be?"

"In the central parts of the European continent, the primeval forests have gone long ago and the wood has changed into a community of culture plants, completely governed by man's hands, and requiring considerable labor and capital from man. They are the prototypes for the forests of the future all the world over. In the Carpathian and Balkan countries, however, there are still quite considerable districts of untouched forests. Yet they are limited in size, and in order to exploit them such costly railroads would be required that these forests cannot greatly influence the lumber prices.

"In Europe, our greatest competitor, and the only dangerous one, is the great North Russian pine district. At present it contains enormous, untouched quantities of timber. However, for the greater part these are not accessible at a cheap price. The levelness of the country, the comparatively slight rainfall, the rivers' chief direction toward the Arctic, their low-water state during the large part of the year, the violent high water, which sweeps down during the snow melting season from South to North, the sparse population of the country, the difficulties of navigating the Arctic, etc., all work together to making the shipping of lumber from these Russian woods to exporting points and consuming centers hard and costly. In addition thereto, private owners must ask a stump price for their wood, be it ever so low, equal to that which the Russian government does on its own vast domain.

"It is not quite impossible that the state would be willing to give away outright the fully grown wood to promote timber felling and effect settlements within certain districts. At the present prices only a strip of certain width along the waterways could be exploited with economical profit. Corresponding to every \$1,353 per 1,000 board feet at which lumber prices are rising in the

world market, a wider strip can be taken. For us, however, this will mean an equivalent rise in our lumber prices.

"The greatest supply of pine wood lumber which in our time can be found on the earth, probably is in the Siberian pine forest district—the so-called *taigan* from Ural in the West to the Pacific Ocean in the East. Is it possible to bring this to the market at prices ruinous to us? I certainly believe that the answer to this is 'No.' With the very great awakening which Siberia will experience in the next half century, strenuous efforts will certainly be made to make this possible. Its existence will be of the greatest importance to the development of the country itself and indirectly it will relieve the world market from its scarcity of lumber, of which Siberia's agricultural districts would have otherwise absorbed a good quantity. Some possibilities may also exist for exportation to other countries in need of lumber. Corea and East Siberia will surely furnish considerable quantities to China and Japan where continuous development after the European model creates a still greater demand for lumber. From the West Siberian *taigan* it is likely that attempts will be made to ship lumber by rail, and above all by sea, from Ob and Yenisei, also over the Arctic, to the central countries of the world market. I am convinced that by means of modern technology, within some decades it will be possible to do somewhat safe shipping from these rivers to Europe, but I am also absolutely sure that the freight rates will be so high that lumber can stand them only when lumber prices have risen so much that forestry in Sweden has become a very lucrative business. For the reasons stated it can hardly be conceived that from the enormous reserves of the Russian and Siberian forests any great quantities can be thrown on the world market at any price which would be ruinous to the industry.

"Out of the great pine wood districts of the ancient world there remains but the Indian district on the slopes of the Himalaya and in its valleys. There, the English for decades have expended extensive and successful labor to bring about good forestry conditions. India is the only country under English rule—not even excepting the mother country—in which rational forestry is practised to any considerable extent.

The enormous quantities of lumber which a big, richly populated country, developing at a lively rate, like India, demands, will hardly be filled from its own forest supplies. Conscientious cultivating of these may, of course, decrease the demand for foreign lumber and thus to some degree aid in keeping down the world market prices, but in the long run it will not be able to hold them on the same level at which they generally have stayed during this decade.

"If we then pass over to the new world, we find on the

North American continent two big forest districts. The great eastern is parted from the western, the Pacific territory, by the vast prairie districts, where nowadays such a large part of the world supply of wheat, corn, etc., is produced. The northern part of the eastern forest district resembles mostly Scandinavia and North Russia, the middle and the south parts the former forest districts of the European continent. Within the more easily accessible districts, man has dealt with axe and fire, and within the less accessible he has ruled with fire, in such a manner that nobody who has not seen it with his own eyes could possibly imagine its like. The result is at any rate, that the wood in those regions from which it might be shipped at prices halfway reasonable, is just as severely taxed as in North Sweden. In addition thereto, a population, with a strong demand for lumber, now counting over 100 million, is living in North America. They will soon be confronted with a real lumber scarcity, which already should have made itself painfully felt, if the big pine woods in the Southern States—resembling the pine woods within the Mediterranean territory, already wasted by Phenicians, Greeks and Romans, etc.—had not provided a short respite. In America, during the last half century there has been a squandering, a wastefulness, surpassing every description. Nothing in the least has been done from a practical point of view up to this century to stop it and to restore the forests. It will also be the scarcity of and demand for lumber which, within some decades, will more than anything else drive lumber prices high.

“But North America has also west of the prairies considerable forest districts. In the Rocky Mountains there are forest lands with sparsely set woods and excellent lumber. These are of great importance to the development of neighboring states, which, for the most part, are poor in woods, but will have but little and indirect influence on the world market of lumber.

“On the other hand, it is quite a different matter with the thick, tall grown, splendid woods which cover the slopes of the Coast Cordilleras toward the Pacific from California in the south to Alaska in the north. There grows the only wood supply of the world which is of real danger to us.

“Not yet have they begun to be exploited on a real large scale, but at any rate the lumber therefrom is our worst competitor in the countries bordering on the Pacific Ocean. Once the Panama Canal is definitely finished it will not take long until “Oregon pine” and other Pacific Coast woods will appear on the European market. Scores of new sawmills and wood pulp mills will be built during the coming decades on the shores of British Columbia, and from there enormous quantities of lumber and paper pulp will flood the world. The wages certainly are high, and the waste is exorbitant, but that can be overcome, and for every dollar saved these well-located, quickly growing woods become more and more capable of competition. Nowhere on the face of the globe are so many millions to be gained by clever, financially strong people.

“Only when the primeval forest supply in the woods on

the North American Pacific Coast is exhausted will the lumber prices rise considerably. When will that happen? That depends on several factors. The world war surely is driving back the economical development for at least one decade; therefore, it may take three or perhaps four decades until those reserves are emptied. It is possible that it will come quicker, depending on how the lumber demand of America itself is growing.

“I have now reviewed the great reserve supplies of existing pine wood. The tropical zones have none such and their woods, for many reasons, never can replace those of the temperate climes. The supply of pine wood in the temperate forests of the southern hemisphere is so insignificant that neither at present nor in the near future could there be any thought of supplying even Australia, South Africa and South America, with their demands for lumber, much less to compete on the markets of the northern hemisphere.

“This inventory proves that really there are very few countries which by nature, position and shipping possibilities, etc., have a chance to produce and to export to the world market any wood products at prices so advantageous to the country as Sweden. When in addition our investigation shows that the demand of the world is steadily increasing, whereas the supply of the world during the next decades surely is going to decrease, it is evident that we confidently can expect to get still better and better payment for the products from our woods. The main thing is to produce as much as possible, so we will have something to sell when the prosperous times are coming. We have still twenty or thirty years in which to prepare. It is important that we use this time well, that with our limited money supply we make every effort to painstakingly and with foresight invest as much as we can in the improvements of our woods. That this will prove highly remunerative to the generation coming after us, there can be no doubt.”

A CONSERVATION EXHIBIT

A unique exhibit in conservation was held during the latter part of May at the Seventh Regiment Armory in New York City under the auspices of the General Federation of Women's Clubs and the personal direction of Miss Mira L. Dock, chairman of the Forestry Committee, and Mrs. John Dickinson Sherman, chairman of the Conservation Department.

The exhibit was of the most practical nature ever held and was no less marked in its aesthetic and poetic features. Shade tree commissions, the United States Forest Service, the United States Bureau of Entomology, the New York State College of Forestry, the National Association of Audubon Societies and Burroughs Clubs all did their best to bring home the fundamental principles that each stood for, and the coordinated efforts of all were an entire success. AMERICAN FORESTRY did its share in obtaining the necessary cooperation and coordinating the various branches.

Wood Preserving Department

By E. A. STERLING,

Ex-President American Wood Preservers' Association.

IT SEEMS a far cry from automobiles to creosote wood, but really there is a close connection. The automobile revived and developed the movement for better roads, and motorists will continue to support better highway construction and maintenance. With the building of modern roads, including county, State and national, arose the problem of economical, safe and permanent highway bridges. It is here that the auto and wood preservation are on common ground.

The steel bridge on country roads has been common for years. Of late the concrete bridge has appeared as a link over streams and depressions. The steel bridge is not giving the service anticipated because in so many cases allowed to rust and deteriorate from lack of painting. The concrete bridge or trestle is expensive and unless well constructed suffers from expansion and contraction where temperature fluctuations are extreme. To meet the demands of economy and permanence, with a minimum of expense for upkeep, the creosoted timber highway bridge is now receiving consideration.

A more logical bridge or culvert material is not known. Creosoted timber will not decay, has the necessary strength, can be worked and handled easily, is not affected by heat or freezing, does not buckle, dent or puncture, does not need painting, and in every way is the ideal material for highway bridges. Recognition is now being given to these advantages, and helpful information which will effect a big saving to taxpayers is being put into the hands of highway engineers and road commissions. The Southern Pine Association has issued an attractive and instructive illustrated booklet on "Culverts and Bridges of Service," and the National Lumber Manufacturers' Association has in preparation a general treatise on the same subject by a well known State highway engineer.

Nor is the use of creosoted wood on highways confined to bridges. It serves for the sluices and ditch protection, holding embankments, and for the posts and fence material along improved roads. All of this development is a conservation measure, because it gives long life to the timber used, utilizes local material in many cases and gives a value to timber which it might not otherwise have.

THE crisis in the creosote market caused by the shutting off of imports has been mitigated to a considerable extent. While the European war still prevents creosote coming from Germany, Great Britain has been supplying considerable quantities of creosote oil. Another influence is the increased domestic output of coal tar and while all is not yet distilled so as to produce the by-product creosote, the home supply has increased

not only temporarily, but probably permanently. An unexpected development of recent months was the receipt of cargoes of Japanese creosote on the Pacific Coast. It was only a few years ago that several Japanese delegations studied the creosote industry in America, but they have already applied the knowledge gained by producing creosote for our markets.

PROGRESS that is slow is often none the less sure. For many years creosoted fence posts have been advocated because economical in themselves and a means of utilizing quickly decaying local timber, which otherwise would often be wasted. This is practical conservation. State agricultural colleges and the United States Forest Service have consistently advocated creosoted fence posts and large numbers are in use. Large consumers, such as railroads, have also used creosoted posts, but only recently have they been put on the market in a wholesale way. A big lumber company is now advertising posts which are thoroughly creosoted and can be depended upon for almost unlimited years of service. This not only means an economical, permanent and easily handled post for the consumer, but is another step in utilizing all parts of the trees which are felled for lumber. The waste through lack of markets for by-products is thus gradually being reduced, and actual conservation of our forests brought a step nearer.

THE small consumers of lumber are not expected to know the details of its best use. Part of the new conception of lumber merchandising is to give the user more facts and information on which to select and properly use the wood he needs for home building purposes. Not a small part of this is concerned with proper preservative treatment. As an aid to this end a new educational bulletin has just been issued by the National Lumber Manufacturers' Association of Chicago on "The Preservative Treatment of Farm Timbers." It is one of a series of farm bulletins, treating in a broad educational way the proper design and use of farm structures.

A MUNICIPAL creosote wood block plant for Detroit, Michigan, has been recommended by the Mayor in his annual message to the Common Council.

THE Louisville & Nashville Railroad Company is reconstructing its timber-treating plant at Gautier, Mississippi. There will be three retorts, one 68 feet by 115 feet, one 6 feet by 133 feet 1 inch, and one 7 feet by 133 feet 1 inch.

Editorial

LOUISIANA FORESTRY AND THE CONSERVATION COMMISSION

AN important hearing was held on June 14 before the committee on Natural Resources of the Louisiana Legislature on the Hughes forestry bill, which proposed to establish a department of forestry independent of the State Conservation Commission and patterned after the forestry law of Texas, under which a technical state forester is appointed by the regents of the state university. The bill was opposed by the Conservation Commission and reported unfavorably, but the hearing served to focus the attention of the State on the fact that up to this time no forestry has been attempted by the Conservation Commission, notwithstanding their responsibility and authority given them under existing laws to undertake this work.

The claim was made by the Commission, and with some justice, that no funds have been available for forestry, since the revenue from the state products tax on timber and minerals went into the treasury and was not a part of their income. The Commission's revenue available for expenditures in the fiscal year 1914-15 was \$87,275.02, and in 1915-16, \$87,706.18. Its expenditures were respectively \$121,324.30 and \$97,174.67. When the idea of consolidating the forestry work of this State with fish and game, minerals, and other resources was adopted, the Commission was given discretionary power in the proportioning of its income to meet expenditures. Fish and game, marine fisheries and other work were already established. Forestry was new and unfamiliar. The inevitable result of this system was the absorption of the entire fund by the more urgent and better organized work and the total neglect of forestry. The technical forester needed to start the work was not appointed, for lack of funds to pay him, and lacking all real incentive for true constructive forestry the Commission did not even urge the specific appropriation of funds for this purpose—an alternative at all times available to them. Meanwhile the State was receiving, outside of the revenue of the commission, the income from the products tax on timber and minerals, which brought in \$113,992.50 for 1913, \$115,496.14 for 1914, and \$92,554.67 for 1915. This tax, paid largely by lumbermen, the State now proposed to double purely as a revenue measure. It was brought out at the hearing that when this products tax was imposed the understandings and intention of its advocates was that the State would expend upon forestry a sum at least the partial equivalent of the tax. This the State had failed to do.

While the committee did not accept the proposed separation of the forestry department from fish and game protection and decided in favor of retaining the consolidation, they did admit the justice of the demand for specific appropriation of funds for forestry, and an amendment was drafted to the timber tax bill, providing that 25 per cent of the revenue from timber alone shall be devoted to forestry. If this measure passes, the Conservation Commission will be enabled to organize a forestry department and will have approximately \$20,000 per year for this purpose.

Effective work in state forestry at present can be conducted on an even smaller appropriation, provided the work is centered in an able, well trained forester whose position is not subject to the changes and uncertainties which are ordinarily the lot of the appointees of a commission organized as a part of the regular machinery for state government. The word "politics" as applied to this situation does not signify either corruption or deliberate neglect and inefficiency. It may be confined in its meaning to the recognized practice of considering offices of an appointive character as due by right to the party in power and to be filled by their adherents. The pressure of such obligations upon the heads of departments is enormous. The plea is that just as good "Republicans," "Democrats" or "Progressives," as the case may be, can be found, therefore the old incumbent must step out.

This principle will not work in state forestry. State forestry organization must be continuously in the hands and under the direction of a man capable of following up the policies inaugurated through many years to a successful conclusion. If his job depends, not on his efficiency, but on the accident of political elections, the state will not secure men of the highest ability nor get real forestry work done.

It remains to be seen whether the proposed organization of the forestry department and its continuance under the Conservation Commission will accomplish this result. In the interest of forestry in Louisiana we sincerely hope that the passage of the proposed measure may be followed by the selection of a state forester of real ability and his retention indefinitely. Initial errors, both in organization and personnel, take years to overcome. The right start means everything to the work of a state.

Canadian Department

By ELLWOOD WILSON

Secretary, Canadian Society of Forest Engineers

There is at present a great shortage of dowels, skewers and small manufactures of hardwood in England and prices have advanced materially. An order for one million hardwood backs for brushes has just been placed in Ontario.

The Department of Forests and Mines of Ontario has just issued a warning that the White pine blister rust has been found on the stock of 1908 and asking all those who planted pine in that year to look over their plantations and see if the disease has appeared.

The Local Chapter of the Daughters of the Empire in Ottawa have started an active campaign to save waste paper. This is a good step, as in this time of awful waste of everything by the nations at war, those at home must save in every way possible.

The price of pulpwood in Canada has increased ten cents a cord for 1916 over 1915, all Provinces except Quebec sharing in this increase. The total consumption has increased as follows: Quebec, 9.7 per cent; Ontario, 7.3 per cent; New Brunswick, 134.8 per cent; British Columbia, 13.2 per cent, and Nova Scotia, 93.7 per cent.

There is a very interesting article in *Espana Forestal* for March on the "Psychology of the Tree." This is a side of forestry seldom treated.

The First Battalion of Lumbermen, the 224th Forestry Battalion, Canadian Expeditionary Force, has done such good work in England that two more battalions have been asked for by the English authorities. One will be commanded by Lt. Col. J. B. White, Director of the Canadian Forestry Association and Late of the Riordan Paper Company, and the other will be recruited in Ontario by Lt. Col. W. R. Smyth, M. P. P., of Algoma.

Mr. R. M. Bagg, of New York, late with the Laurentide Company, Ltd., enlisted in the First Forestry Battalion.

Mr. K. C. Baker, of Greenwood, N. Y., who is a graduate of the University of Michigan, and worked for some time with the Laurentide Company, Ltd., and then went out to Singapore for the United States Rubber Company, has just been home on a visit, and has married Miss Kellogg, who will return with him to the Far East. Mr. Baker has been in charge of rubber plantations and also has been sent to India and China on some trade missions.

Two young reindeer have been born in the herd of the Laurentide Company, Ltd., which are believed to be the first ones born on the continent in Canada. They are now about three weeks old, much lighter in color than the adults and are growing finely. The herd now consists of three males, four females and two fawns.

Mr. R. R. Bradley, Forester of the New Brunswick Railway Company, was married recently.

The Belgo-Canadian Pulp and Paper Company, Ltd., of Shawinigan Falls, Quebec, is considering planting and has already done something on a small scale. Mr. L. Devenyns, their Superintendent of Woodlands, who is a Belgian, went over as soon as war broke out and did splendid service in the gallant Belgian Army until wounded so seriously that he was invalided and has now returned to his work in Canada.

Pte. E. G. McDougall, of the Canadian Society of Forest Engineers and of the British Columbia Forest Service, has been wounded.

Mr. W. L. Scandrett, of the Canadian Society of Forest Engineers, and Messrs. Bentley and Hughes are all in England in the army, the former being in the aviation corps.

The excessive rain in Quebec this season has been a great help in the prevention of fires and in planting operations. The St. Maurice Forest Protective Association reports on one or two small fires and that the settlers and farmers are co-operating with the fire-rangers in a way which a few years ago would have been thought impossible. Arrangements have been made with the National Transcontinental Railway in regard to patrolling their right of way, by which the railroad will pay one-third of the cost of the labor and will pay for gasoline and oil consumed by the power speeders. Thanks are due Mr. Brady, of the Transcontinental, for taking this position. All the St. Maurice rangers have this year been uniformed with green shirts with "Protection Foret" in red letters across the chest. The Parish Priests have done a great deal to help the Association.

Mr. G. C. Piché, Chief Forester of Quebec, has changed the date of his forestry meeting from this month to the month of August. He has much interesting work to show and it is hoped that many American foresters will attend the meeting and also avail themselves of the opportunity to see the work of the Laurentide Company, Ltd., and the ancient city of Quebec.

Mr. P. Z. Caverhill, Forester of New Brunswick, has his work now organized and is covering about 60,000 acres per month. His staff consists of Messrs. G. H. Prince, H. C. Belyea, Pellerose, J. W. Burn, Jago, Kilburn, Lee, F. S. Young and Percy Crandall.

Mr. R. H. Campbell, Director of the Dominion Forest Branch, has been elected a member of the Society of American Foresters.

The Annual Special Number of the *Canada Lumberman and Woodworker* is just out and is the best ever issued.

The Wayagamac Pulp and Paper Company, which left the Cooperative Association on the plea that it cost too much to have their limits ranged by the Association, is finding it much more expensive to do the work itself.

In the *Canadian Forestry Journal* for May there is a very interesting article by Mr. J. C. Blumer on "A Winter Survey in North Saskatchewan," in which Mr. Blumer tells of his trip in that country and describes conditions both as regards the Indians and the timber. He notes a temperature of 53 degrees below zero on one occasion.

Mr. Clyde Leavitt, Forester to the Dominion Conservation Commission, has a splendid article on "Forest Conservation as a War Measure," in which he says that "Natural resources lie at the foundation of all preparedness whether for peace or for war," and gives a ringing call to action for the elimination of politics and the introduction of common-sense efficiency in the handling of our Government-owned natural resources.

The work on the big storage dam under construction by the Quebec Government on the upper waters of the St. Maurice River is progressing favorably and will be a great help in controlling water conditions on which the industry of the whole valley depends.

A postal card has been received from Australia from Mr. MacMillan, Forester and Trade Commissioner of the British Columbia Government from Australia. Mr. MacMillan's trip around the world is already bearing fruit for his Government, and shows a wise and far-sighted policy on its part.

Fire Conditions in the Northwest

The statutory forest fire season, during which permits for slash burning and other precautions are required, is now on in the Pacific northwest, with conditions offering little immediate danger, according to bulletins received by the Western Forestry and Conservation Association. The wet weather has, however, prevented the usual spring cleaning up of loggers' and settlers' slashings, thus leaving a greater menace when dangerous weather arrives. Except in rare cases, with unusual care and under permit and supervision, it will not be safe to burn now before fall and the winter's accumulation will create serious hazard all summer. For this reason preparations are being made for strict enforcement of all fire laws, especially those dealing with clearing and with spark-emitting engines.

Warning the public of approaching weather conducive to forest fires will this year be recognized by the United States Weather Bureau as a necessary service comparable to storm and frost warnings. In addition to the telegraphic forecasts of hot and windy weather usually furnished the private and public patrol forces, predictions will also be mailed to post offices in forest regions, for conspicuous posting where they may be seen by people likely to use fire in clearing and by campers and travelers. A special card has been devised, bearing fire precautions on the margin.

Coolidge in Business

Forester Philip T. Coolidge on July 1st opened an office at Bangor, Maine, for the practice of forestry and will devote himself to the development of the business. He will specialize in management and protection of woodlands, improvement cuttings, planting, timber estimates, maps and surveying.

Mr. Coolidge graduated from Harvard in 1905 and from the Yale Forest School in 1906. He was employed as a Technical Forester by the Forest Service in the West from 1906 to 1909, the U. S. Forest Service again in 1914 for examination of conditions in Maine and Pennsylvania, as to the possibilities of government land purchase under the Weeks Law through which the government is buying land for forest reserves in the White Mountains in New Hampshire and in the Southern Appalachians. He was Professor of Forestry at Colorado College from 1909 to 1912 and during the years 1912 and 1913 he was director of the Ranger School of the New York State College of Forestry.

The Zimmerman Pine Moth

By the simple method of using the "spike-topped," lightning-struck, and gnarly branched mature trees for firewood or other domestic purposes, the entomologists of the United States Department of Agriculture believe that the damage done by the Zimmerman pine moth, especially to yellow pine in the West and white, red and various other pines in the East, can be greatly minimized.

As a general rule, trees that below the spike show branches with yellow needles are almost certain to be infested. Such trees, as well as lightning-struck trees which remain green, and those showing knobby growths on branches are likely to harbor great numbers of insects—to be the brood trees—and should be cut out and burned or used for firewood before spring; otherwise the moths resulting from the caterpillars in these brood trees will attack the second growth, and when a tree is badly attacked the pest may kill big portions of it besides making the lumber pitchy and unsuitable for anything where shrinkage is objectionable.

If the brood trees are cut out, woodpeckers, especially the hairy woodpecker, will probably attend to the lighter infestation in the young trees, as this bird has been observed to feed heavily on this caterpillar. This remedy is particularly strongly recommended for wood lots, as a number of experiments have shown that by using the right trees for firewood the damage is either greatly minimized or absolutely controlled.

Our Tree Pictures

The fine White oak tree which was the cover picture of the January issue of *AMERICAN FORESTRY*, stands on the Guyer

farm at Warriors Mark, Huntington County, Pa., and the elm, which was the cover picture in the May issue, is owned by Mrs. Montgomery, of Shippensburg, Pa.

Photographs of some of the elm trees in the May issue were by Nathan R. Graves, 84 Exchange St., Rochester, N. Y.

Mt. Alto Forest Students

Of the twenty-one men who took the examinations last week for entrance to the State Forest Academy at Mont Alto, Pa., fifteen have been accepted. Five have been assigned to the Clearfield State Forest, five to the Greenwood Forest in Huntingdon County, and five to the Buchanan Forest in Franklin County. They will spend six weeks in practical woods work, at the end of which an additional examination will be given, and the ten men with the highest standing will be admitted to the Academy.

Book Reviews

"My Home in the Field of Honour." By Frances Wilson Huard. 12mo. Geo. H. Doran Co., N. Y. Net. \$1.35.

This is a graphic account of civilian flight before battle in this war. A woman's retreat from her beautiful home northwest of Paris, and the simple but dramatic narrative of her experiences. Frances Wilson Huard (La Baronne Huard) is the wife of Charles Huard, official painter of the Sixth Army of France, and the daughter of Francis Wilson. She has now a hospital at her chateau of Villiers, and has been giving talks in America in its behalf.

"American Boys' Book of Bugs, Butterflies and Beetles." By Dan Beard. Lippincott's, Philadelphia. Price, \$2.

Dan Beard—a name to conjure with, for boys—has invented a new method of studying natural history. The myriad activities of the great Chief Scout and Pioneer of America in behalf of American boys, lead naturally to this service. He opens a door that will tempt every live boy—and his sister, as well—into the fascinating world of natural history. Dan Beard cannot see any reason for taking the pleasures of life with long faces. If any youngster doubts that a study of this book is entitled to rank as a pleasure, it is because he is not acquainted with the author's method. It was a pleasure to Mr. Beard himself from the first hour that he can remember, and he has never lost his enthusiasm, nor the power to impart it to others.

"The Alligator and Its Allies." By A. M. Reese. Putnam's, New York.

Using the alligator as the type for the study of the Reptilia, the book first discusses the classification, habits, distribution,

etc., of the Crocodilia, with especial emphasis upon the American Alligator. Some space is given to the economic aspects of the group. There follow chapters dealing with the anatomy of the skeletal, muscular, digestive, respiratory, vascular, nervous, and urogenital systems. The concluding chapter is a description of the development of the American Alligator. An extensive bibliography of works dealing with the Crocodilia follows the descriptive matter and is followed, in turn, by an exhaustive index. The book is illustrated with 65 figures and 29 plates, many of which are new, while others are taken from well-known sources.

"The Industrial and Commercial Schools of the United States and Germany. A Comparative Study. By Frederick W. Roman, Ph.D. Putnam's, New York.

This book is offered as a basis for industrial and commercial training, a comparison of the character, quantity and quality of the instruction offered in the elementary school systems of the United States and Germany. The grades reached by the pupils before leaving the elementary schools are contrasted; also the pupils' attitude toward work, play, and life in general. The book gives an excellent insight into the industrial and commercial strength of the two nations.

Three Sons and a Mother. By Gilbert Cannon, \$1.50. George H. Doran Co., New York.

This is the story of a Scotch family—of Margaret Keith Lawrie, who brought up her three sturdy boys and two lassies on a paltry 90 pounds a year. Of the Lawrie boys' careers in the bustling English town of Thrisby, where their Uncle Andrew offered them a "start" in his cotton mill—and then died.

Good Old Anna. By Mrs. Belloc Lowndes, \$1.35. George H. Doran Co., New York.

Simple, faithful, loyal to her mistress, the Minor Canon's widow in the little English cathedral town! How cruel it was that the Great War had to come, that this placid, industrious old servant had to be made the tool of the astonishing German organization. This is a subtle, convincing picture of one of the grim phases of the war.

With the Zionists in Gallipoli. By Col. J. H. Patterson, D. S. O., \$2. George H. Doran Co., New York.

The Zion Mule Corps—500 officers and men—was the first Jewish military unit formed in 2,000 years. It consisted of Russian-born refugees in Palestine, who, rather than serve the Turks, preferred to return to Egypt, the old land of bondage and later to serve under the English government against the Turks and Germans.

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MONTHLY LIST FOR JUNE, 1916.

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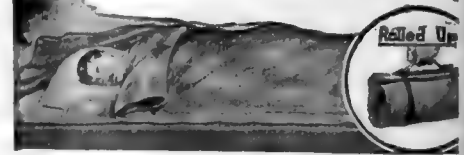
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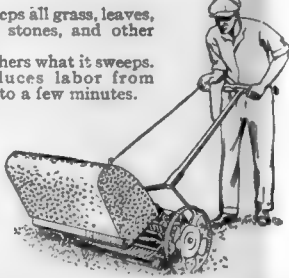
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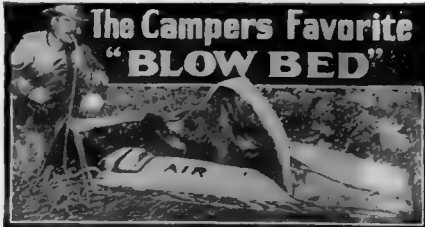
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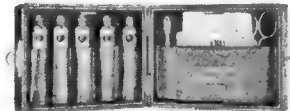
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AMERICAN BOYS' BOOK OF BUGS, BUTTERFLIES AND BEETLES.....	\$2.00
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THE PRACTICAL LUMBERMAN—By Bernard Brereton (third edition).....	1.50

* This, of course, is not a complete list, but we shall be glad to add to it any books on forestry or related subjects upon request.—Editor.

Skogen, Apr., 1916.—Såddäckarnas bearbetning vid skogssådd (Cultivation of seed spots in direct sowing), by Ferd. Lindberg, p. 117-20; Omskolning av planter (Transplanting in nurseries), by Gösta Mellström, p. 121-33; Ett inlägg i frågan om "den lägre skogsundervisningens ordnande" (A contribution to the question of regulation of lower forest education), by J. A. Amilon, p. 137.

Skogsvårdsföreningens tidskrift, April, 1916.—Skogspolitiken och skogsarbetarefrågan (Forest politics and the problem of forest workers), by Gösta Tamm and others, p. 355-70; Behovet av fasta skogsarbetare på de norrländska kronoparkerna (The need of permanent forest workers in the state forests of Norrland), by And. Holmgren, p. 371-400; "Några kritiska synpunkter vid beståndsanalyser" av H. Kylin och G. Samuelsson; ett genmäle (A reply to "Some critical observations in regard to stand analysis," by H. Kylin and G. Samuelsson), by Torsten Lagerberg, p. 401-22; Om beräkningen av medelfelen i Värmland staxeringen (Concerning the calculation of the average error in the Värmland reconnaissance), by Henrik Hesselman, p. 423-4; Smärre iakttagelser och naturminnen (Spruce with cone-bearing terminal twigs), p. 425; För-sök till utvinning av harts och terpentiner ur skogarna i Tyskland (Investigations concerning the production of resin and turpentine from the forests of Germany), by Gunnar Schotte, p. 426-30.

FORESTERS ATTENTION

AMERICAN FORESTRY will print free of charge in this column advertisements of foresters wanting positions, or of persons having employment to offer foresters

ATTENTION, LUMBERMEN! I would like to communicate with any lumber company expecting to establish a direct export trade with Europe or Great Britain after the present war. Any firm desiring a representative agent or salesman for export trade can get fuller details by addressing Box 33, care of AMERICAN FORESTRY.

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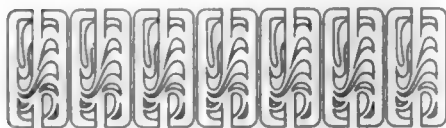
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"IN EVERY CASE it is the duty of the wholesaler or the man who sells timber direct to the ultimate consumer, to ascertain the use to which it is to be put, and that,

"LUMBERMEN representing all branches of the industry should immediately take steps as above suggested, and in other ways ascertain whether the material ordered or specified is suitable for the use in view, and in all cases give assistance in the selection of grades and kinds, to the end that the consumers may receive the satisfaction and service which they obtain from other building materials."

This resolution, unanimously adopted at the annual meeting of the N. L. M. A. in Chicago, June 1, 1916, marks another forward advance by the lumber manufacturers of the United States. It means that the lumbermen recognize a definite responsibility to give the consumer standard goods that can be relied upon.

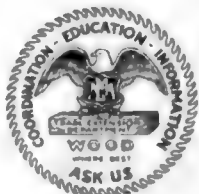
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American Forestry

Vol. 22

AUGUST 1916

No. 272



SEP 20 1916

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The Magazine of the American Forestry Association

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AUGUST 1916. VOL. 22

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The Hickories

Identification and Characteristics

BY SAMUEL B. DETWILER

THE hickories are characteristic American trees closely related to the walnuts, with a name derived from the Indian "*Pawcohiccora*," a dressing eaten with hominy, made from the milk of the pounded hickory nuts.

"Tough as hickory" is a phrase suggesting the peculiar strength and elasticity of the hickory wood. General Andrew Jackson was endearingly called "Old Hickory" by his soldiers because of his tough, unyielding disposition. This nickname may have been bestowed during the war with the Creek Indians in 1813, when he fed his men on hickory nuts over a period when they were short of rations.

Twelve kinds of hickory are found in the world, according to Professor Sargent, eleven of them indigenous to the United States, east of the Rocky Mountains, and one Mexican species. Some botanists recognize fifteen members of the hickory tribe, while others consider there are but eight distinct kinds. Previous to the Ice Age, extensive forests of hickory existed in Greenland and Europe, but no hickories are now found growing in a state of nature outside of North America.

The area in which the hickories grow covers about one-third of the United States. The various kinds have distinct regions for their growth, but all of the important ones may be found growing in western

Tennessee, northwestern Mississippi and eastern Arkansas. The hickories are picturesque members of the forest and have been called "the artist trees." In winter the armor-like bark, gnarled branches and stout twigs suggest tall, well-proportioned athletes of iron strength. In the spring-time the tinted bud scales or dainty leaves and tasselled flowers make these trees as beautiful as many that bear more gorgeous blossoms. The summer foliage casts dense shade and outlines the tops in graceful symmetry. When Nature colors the autumn landscape, the clear yellow of the hickory is conspicuous for a brief time, and, though the leaves are shed suddenly, they retain their bright color long after they fall. It is an old belief that if the hickory leaves are a brilliant yellow in the autumn, the next harvest will be a rich one.

The leaves of the hickories have an alternate arrangement and consist of 2 to 5 pairs of separate leaflets on a central leaf stem tipped with a single leaflet. The pollen-bearing flowers appear shortly after the leaves. They are greenish scales hanging in long, slender chains, three in a cluster, from a common stem attached to the twig at the base of the spring growth. Each scale bears on its lower face from 3 to 10 little yellow stamen heads. From 2 to 11 flowers are borne in a spike at the tips of the twigs and develop into the fruits. These nut-forming flowers are small and colored



LEAF, FLOWER, NUT AND TWIG OF MOCKERNUT HICKORY

yellowish green like the young leaves surrounding them. Each flower consists of several tiny scales tightly enclosing a small globular body from the centre of which two small plumes protrude to collect the pollen as it floats through the air. The central part of the flower consists of four communicating chambers in which there



From Pennsylvania Trees

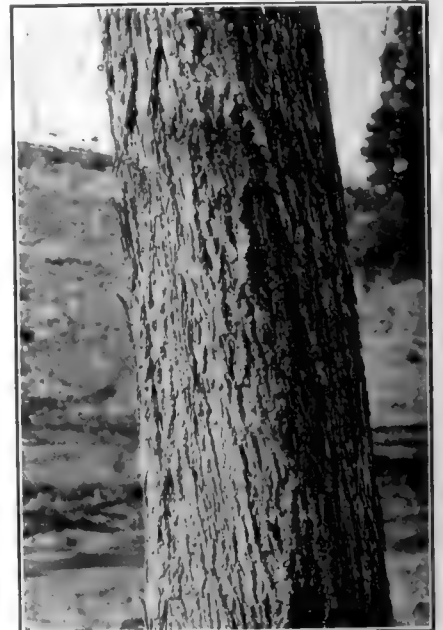
MOCKERNUT HICKORY

is a single rudimentary plant. During the summer starches and oils are packed into the seed leaves of this little plant until they fill the four compartments and are known as the kernels of the nuts. With the frost of autumn, the husk splits into four parts, freeing the hard-shelled nut. The Shagbark (*Hicoria ovata*), sometimes called the shellbark, is important not only because it produces nuts with large, finely flavored kernels, but also because of the high quality of its wood. Its leaves vary from 8 to 14 inches in length and commonly have five leaflets, but occasionally seven. The leaflets vary in size, the lower pair being small, the succeeding pair or pairs growing larger and broadening out at their tips, the single leaflet at the end of the stem being largest of all. The nuts are white, half an inch to an inch in length, and of about the same width, and are enclosed in a husk half an inch thick. They are considerably flattened with four sharp ridges on the sides, so that the nut is more or less four-edged. The Shagbark is one of the tallest hickories, sometimes attaining a height of 120 feet and a diameter of 3 or 4 feet but more often only about half this size. In dense forests the trunk is straight, tapering slightly and free from branches for the greater part of its length. In the open the trunk branches are low to form the narrow, open, cylinder-shaped top that is quite generally characteristic of the hickories. The long, ragged strips of dark-gray bark that clothe the trunk make this tree conspicuous and prove that "shagbark" is a well-chosen title. These strips may be 3 to 8 inches wide and 3 feet or more in length, and are frequently attached to the tree at the middle, leaving the ends of the strips swinging free. Young trees have smooth, greenish or grayish bark.

The Shagbark grows in rich, deep, rather moist soils, in valleys and on hillsides from southern Maine and Quebec west to Minnesota and south through the Appalachian Mountains to Florida and eastern Texas. The

Big Shellbark (*Hicoria lacinosa*) has a more restricted range, being found from central New York and eastern Pennsylvania to Tennessee and Arkansas. This tree selects rich bottom lands, preferably sites that are flooded for short periods of time. It is closely allied to the Shagbark, growing equally tall, but seldom over 3 feet in diameter. Its bark is less ragged than that of the Shagbark and its leaves are longer (10 to 22 inches), consisting of 7 to 9 leaflets. The nut is longer and much broader than that of its nearest relative, dull white or yellowish in color, with 4 or 6 heavy ribs on its sides. The ends of the nut are usually strongly pointed, unlike the nut of the Shagbark, which is rounded or notched at the end, and the husk and the shell of the nut of the Big Shellbark are much thicker.

The North Carolina Shagbark (*Hicoria Carolinae-septentrionalis*) has shaggy bark but it has smaller leaves, buds and fruit than the other shagbarks, and is a much smaller tree. It is distributed through the uplands of western North Carolina, eastern Tennessee and northern portions of Alabama and Georgia.



From Pennsylvania Trees

PIGNOT HICKORY

The Pignut (*Hicoria glabra*), the Small Pignut (*Hicoria odorata*), and the Mockernut (*Hicoria alba*), by some are called "Black Hickory." This term refers to the darker color of the bark. Because they have a high proportion of white sapwood, they are also called "White Hickory." The Pignut grows practically throughout the same territory as the Shagbark, except that it follows the Atlantic Coast to Florida, and is also found along a portion of the Gulf Coast. As a rule it chooses to grow in the dry soils of ridges and hillsides. Although it may grow 90 feet high and 3 or 4 feet in diameter, it is uncommon to find trees exceeding 2 feet in diameter and 60 or 70 feet in height. The trunk, straight and free from branches when growing in the woods, is apt to fork and form a double top when growing in the open. The dark-gray bark, which is tight and close, is separated by narrow, flattened ridges into small, diamond-shaped areas, on the order of the fissures in the bark of white ash, but less regular. The leaves are 8 to 12 inches long, with 5 to 9 leaflets (7 commonly, 9 rarely); unlike the Shagbark, the individual leaflets vary comparatively little in size or shape. The nuts are small (less than an inch in length), rounded or

pear-shaped, light-brown in color, with a smooth shell of variable thickness but usually heavy and hard to crush. The kernels are small, at first with a palatable flavor, but soon becoming strong and somewhat bitter, "fit only for pigs." The husk of the Pignut is thin and leathery, and the four valves do not separate readily from the nut or from each other like the thick "hull" of the Shagbarks.

Several varieties of Pignut are known to botanists, and one of these varieties is so different that by some it is considered a separate species, by others a cross between the Shagbark and the Pignut. This is the Small Pignut, which ranges from eastern Massachusetts to Maryland, west to Missouri and southern Illinois. It has rough, slightly shaggy bark. The small leaf usually consists of 5 leaflets, and the nut is small, thin-shelled and spherical.



From Pennsylvania Trees

BITTERNUT HICKORY

The Mockernut, Bigbud or Whiteheart Hickory has bark that is decidedly rough but does not loosen in strips. The color of the bark varies from light to dark gray. Shallow, irregular fissures separate the surface into broad, flat ridges, covered with tight-fitting scales. The Mockernut has the stockiest twigs and the largest buds found among the hickories. The leaves are 8 to 12 inches long, with 7 to 9 leaflets, and give forth a pleasant aroma when crushed. The large nuts are globular, or sometimes slightly compressed, with a nearly smooth and very thick brown shell. It contains a sweet kernel which is so small that it disappoints one who has taken the trouble to crack the heavy shell. Mockernut trees, 150 feet in height and 3 feet in diameter, are occasionally found, but the usual size is 50 to 75 feet high with a diameter of less than 2 feet. It grows on ridges or in rich valley soils over the same range as the Pignut and, like the latter, it does not form quite as long or as clean trunks as the Shagbark.

The hickories which have been described are alike in having nuts with hard, bony shells that are not easily

broken. Another group of hickories, of which the Pecan and Bitternut are typical, produces nuts with thin, brittle shells. In the first group the winter buds are covered with numerous overlapping scales; in the second, the scales are in pairs, the edges of which meet like the two halves of a clam shell, to enclose the tender growing point of the bud. It is interesting to distinguish trees in winter by means of their buds, and the hickories offer an exceptional opportunity for this study. The buds of each species are as unlike and as easily distinguished from each other as the fruits and nuts. It is one of the pleasures of spring to watch the unfolding buds of the Shagbarks. The



From Pennsylvania Trees

SHAGBARK HICKORY

inner bud scales curl backward and enlarge until they are several inches long, and in their silky texture and gorgeous reddish tints resemble the petals of a flower.

The Pecan (*Hicoria pecan*) is distributed from southern Iowa, Illinois and Indiana, western Kentucky and Tennessee to central Alabama and westward to southeastern Arkansas and central Texas. It is usually found on low, rich ground in the vicinity of streams. The Pecan is the loftiest and most imposing of the hickories, and one of the most beautiful trees of the South, rising to a height of 100 to 170 feet, with a maximum diameter of 4 to 6 feet. The trunk is more or less swollen and buttressed at the base, and branches into a broad top which is oval in outline. The leaves are a beautiful, bright yellow-green, 12 to 20 inches long, bearing from 9 to 17 leaflets. The nuts are 1 to 2 inches long, smooth, reddish and slender, but tapering at the ends, and so thin-shelled that they may sometimes be crushed with the fingers. The kernel is large and sweet. The thin, dark-brown husk splits into four sections nearly to the base, discharging the nut, and frequently remains on the branch during the winter.

Two trees bear the name of Bitter Pecan. One of these is *Hicoria Texana*, which grows sparingly over a small area in eastern Texas. It has leaves 10 to 12 inches long with 7 to 11 leaflets. The nuts are oblong, somewhat flattened and the shell is longitudinally grooved and roughened. The kernel is very bitter. The other Bitter Pecan, also called Water Hickory, is the least useful member of the family. It grows sparingly in river swamps from southeastern Virginia to Florida and along the coast of the Gulf States to Texas, extending northward through

the Mississippi Valley to southern Illinois. The leaf is 9 to 15 inches long, with 7 to 13 leaflets. The husk is thin and brittle and does not separate readily from the nut. The latter is one to one and a half inches long and nearly as broad, and with a much wrinkled, corrugated exterior resembling the shell of the butternut.

The Bitternut (*Hicoria minima*) has a long, clean trunk that may have a height of 100 feet and a diameter of 3 feet, but its ordinary height is 50 to 75 feet with a diameter of 1 to 2 feet. It is a handsome tree with a rounded top and glossy, bright green foliage. The leaves are 6 to 10 inches long, composed of 7 to 11 narrow leaflets, the smallest of all hickory leaflets. The bark of the Bitternut is light gray, thin, tight-fitting and roughened by a rather uniform network of narrow ridges and shallow fissures. The fruit is small and nearly spherical, with a smooth shell which is at times almost paper-thin and packed tight with an exceedingly bitter kernel. The kernels are so rich in fat that a hundred years ago they were sometimes pressed to extract oil for use in lamps and as a substitute for lard. The Bitternut grows in moist lands from Maine and Ontario to Florida and west to Minnesota, Nebraska and Texas.

The Nutmeg (*Hicoria myristica formis*) is a native of South Carolina, central Alabama and Mississippi and southern Arkansas. It grows in rich soils along rivers and in swamps, and sometimes on high land. It is a straight tree, 80 to 100 feet high, and often 2 feet in diameter, with stout spreading branches that form a narrow, open head. The bark is reddish brown, broken into small scaly plates. The leaves are lustrous dark green, silvery beneath, thin and firm of texture; they are 7 to 11 inches long and bear 5 to 11 leaflets. The nut is small and covered with the thinnest of husks which splits into quarters nearly to the base. Unlike the Bitternut, the nuts have a thick shell and the kernel is sweet.

The wood of the hickories is heavy, strong and very hard and tough, but it is not durable in the soil or exposed

to the weather. It is noted for its flexibility and elasticity. The rings of annual growth are marked by one or more rows of large pores. The proportion of sapwood varies with the species and the age of the tree. It is white and very distinct from the reddish-brown heartwood.

Hickory trees growing near the northern limits of their range are liable to be injured by late spring frosts. Occasionally they suffer from a leaf-spot fungus and from some of their numerous insect enemies. The most serious of these is the hickory bark beetle, which has killed large numbers of hickory trees in the northern states during the past few years. The larvæ feed in the living cells between the bark and sapwood and girdle the trunks. This insect can be controlled by applying proper remedial measures, but this requires concerted action by all the owners of hickory trees in the locality and the work should be undertaken before the insects have become well established.

The hickories are desirable shade trees; the best for ornamental planting are the Pecan (hardy as far north as New York), the Bitternut, Shagbark, Mockernut and Nutmeg Hickory. The latter has many qualities that especially recommend it, but its hardiness in the northern states is not well known. The Pecan, Shagbark, and Big Shellbark are valuable for planting for nut production. The many horticultural varieties of pecans and the extensive

planting of pecan orchards in the South are developments of recent years. It is only a matter of time when careful selection and breeding will add many more improved varieties of Pecan, Shagbark, Big Shellbark and perhaps other species.

The hickories have pronounced taproots which make it exceedingly difficult to successfully transplant seedlings from a nursery. Except the Bitternut, which is less sensitive, if the trees grow at all, they seldom have much vigor. The better plan is to gather the nuts as soon as ripe and plant them at once where the trees are to stand permanently. That this method is successful is demon-



Photo by Romeyn Hough

THE SHAGBARK HICKORY

Note the characteristic tall, oblong crown even in field growth. By some this is called the national tree of America.

strated by the many hickory trees that develop from nuts buried and forgotten by the squirrels. Since squirrels and other rodents are inclined to raid plantations when the hickory nuts are sown in the fall, spring planting is preferable. The nuts may be kept in fit condition for spring planting by burying them, well protected, in moist sand, but in this case they should not be covered deep enough to prevent the frost from cracking the shells.

Hickories grow slowly compared with many other trees and for satisfactory growth they require deep, rich soil. Some species are less exacting in regard to soil than others, and it is always well to study the natural conditions under which these trees grow before attempting to plant them. The Pecan grows more rapidly than any of the other species and may produce a small amount of fruit in ten years.

Commercial Uses of the Hickory

THE first explorers of eastern North America called the hickories "walnuts" because they slightly resembled the Circassian walnut, with which they were familiar. Captain John Smith wrote of "pawco-hiccora," the pleasantly flavored dressing which the Indians ate with crushed corn. The squaws crushed hickory hulls and nuts in a wooden mortar, to which water was added until it formed a milky liquid. The name used by the Indians was given to the trees by the early settlers, being shortened into hickory.

The ripe hickory nuts furnished the Indians with a valuable part of their winter food, and some tribes gathered large quantities, especially in the South, where a single family sometimes stored a hundred bushels. In the eastern United States and the Mississippi Valley, the Indians made most of their bows and war clubs of hickory wood. In the early part of the summer, bark peeled from young hickory trees was used for ropes and cords. During the rest of the year, hickory withes—the stems of young seedlings or sprouts made pliable by twisting—were used to tie bundles, bind wigwam poles together, and for similar uses. The early settlers frequently substituted hickory withes for rope, wire or nails, and many farmers still find them useful in an emergency.

Hickory sap furnished an ointment or liniment which was once used to "supple the joints." Dry and decayed hickory wood made the best punk in a day when flint and steel had not been replaced by the convenient matches. This fact was learned from the Indians, who likewise taught the settlers how to preserve meat with hickory ashes. The old-fashioned home-cured hams were given their exceptionally rich flavor by curing them in smoke from a hickory

fire. Hickory wood was also preferred for curing tobacco artificially because it produced a steady heat, burned for a long time and required little attention. The farmer's wife made special provision to save the hickory ashes in the ash hopper for soap making. Old-time blacksmiths used hickory charcoal before coal and coke were available. Strips of hickory bark and hickory splints were much used in weaving baskets, chair seats, and other home-made articles of furniture. For nearly 200 years the split broom, usually made from hickory, was the principal apparatus for sweeping. A section of a sapling, 4 or 5 feet long and 2 or 3 inches in diameter, was chosen and the butt end was shaved into a thousand or more thin splits, each about 10 inches long, without detaching them from the stick; when the splits were tied together with string, the broom was ready for a year's service.

Many old-time appliances made of hickory, such as swingles, cringles, hand fids and gluts, are long forgotten. Hickory ramrods were used in loading the long rifles and muzzle-loading shot guns. No other wood was considered suitable for ax handles when hickory could be obtained. The smooth, slender, yielding handles made American axes famous for their efficiency. Hickory has long been and will continue to be a favorite for handles of all kinds. Hoop making was one of the early industries that consumed large quantities of hickory saplings. Hoop poles were 1 to 2 inches in diameter and from 9 to 15 feet long. They were used for hooping many kinds of barrels, kegs and tubs, but probably more were used on tobacco hogsheads than any other container. Cutting hoop poles was responsible for the destruction of immense numbers of fine young hickory trees and it is only through the



HICKORY BARK BORERS

The holes made by the hickory bark borers which have developed under the bark and bored their way out.

invention of improved hoops in rather recent years that this drain on the hickory supply was checked.

The principal supply of commercial hickory comes from Tennessee, Arkansas, Kentucky, Missouri, Indiana and Ohio, although some hickory is produced in thirty-three or more states. It is estimated that the yearly output of hickory lumber in the United States is less than four hundred million feet, board measure. The wood of the various kinds of hickories varies in hardness, elasticity, weight and color. Users of hickory seldom make distinctions according to species but depend on inspection to secure the kind of wood that meets requirements. Some species are so lacking in good qualities that they are seldom cut for the market. "Second growth" hickory comes from trees which have grown rapidly on land from which the large trees have been lumbered, or from trees growing in the open. The greater value of this wood lies in the fact that the wide rings of annual growth have a high proportion of dense summer wood.

Pin-hole borers sometimes lessen the value of the wood of live hickory trees. A greater loss is due to "iron streaks." This defect is caused by a discoloration of the wood which starts in small holes through the bark made by the sap-sucker, a species of woodpecker that is very fond of the sweet sap of the hickories. The discoloration affects the appearance of the wood rather than its mechanical qualities. After hickory wood is cut and is being seasoned, it is very liable to be attacked by beetles that honey-comb the lumber, leaving behind them large quantities of powdered wood. After the beetles are at work, little can be done to save the lumber, but they may be kept out of newly sawed lumber by sprinkling it with oil.

Shagbark is generally believed to furnish the highest quality of hickory wood, and to best meet the severe requirements of carriage and wagon work. The Big Shell-

bark hickory has wood that is very similar and almost equally valuable. The Pignuts produce wood of high quality which is used to a greater extent than that of any other of the smooth bark hickories. The Mockernut has darker heartwood than the Pignut but the wood is about the same in quality. These trees have a wide ring of sapwood surrounding the heart and for this reason have been preferred for certain uses because it was believed that the sapwood was stronger than heartwood. Investigation has demonstrated that there is no perceptible differ-

ence between heartwood and sapwood except that the heartwood is more apt to be knotty. Much hickory that was formerly wasted because of "red heart" is now accepted by the inspectors. Hickories in the Shagbark class have thin white sapwood, light-brown heartwood and the wood is more apt to be straight-grained and free from imperfections than the wood of Pignut and Mockernut.

Bitternut hickory is not regarded as producing a high class of wood for commercial use. The thin sapwood partly accounts for the prejudice against it and it is probable that in the future this wood will be more highly rated.

Nutmeg hickory has wood of fair

quality but is not much used because the tree is limited in its distribution. Water hickory and Pecan all produce wood that is comparatively weak and light in weight. Their wood is of slight commercial importance because it is inferior in every respect to the other hickories.

Much hickory was formerly used in agricultural implements that were manufactured on the farm or in the local wheelwright shop. Among these were mauls, flails, plow handles, cradles, scythe snaths, ox yokes, and rakes of all kinds. Dozens of modern farm tools and machines ranging from plows, planters and cultivators to reapers, stackers and fertilizer distributors could not well dispense with the hickory that forms various parts of them. The



HICKORY FOR VEHICLE PARTS

Hickory is first in importance among the woods used in vehicle parts, red and white oak being next. The photograph shows hickory and oak spokes piled for seasoning in the plant of a large hub and spoke manufacturer.

manner in which hickory is now employed is largely a fuller development of its earlier uses. Nearly one-half of the hickory used by manufacturers of the United States enters into the construction of vehicles and at least one-third into handles of various kinds. Agricultural implements probably follow these in the amount of hickory used. Carriages and buggies are American inventions made possible through the superior qualities of hickory wood. Not only have they been highly important business and pleasure vehicles for millions of Americans, but they have been sent to all parts of the civilized world and may be seen in central Africa or the deserts of Arabia, or traversing rocky roads in India. Hickory surpasses any known wood in its ability to resist the excessive strains to which the spokes of light carriage wheels are subjected. No other country has wood to make vehicles so light in weight yet so strong and durable.

Credit must be given to hickory wood for the development of our famous American trotting horses, for the splendid qualities of this wood made it possible to build racing sulkies of a lightness never before known. In the light rim of the swiftly moving bicycle wheel, hickory is just as serviceable as in the humble wheel-barrow. Other woods serve well for heavy vehicles; nevertheless, hickory is largely sought for spokes, fellos and other parts of heavy wagons and automobiles. It is used in dump-carts, drays, stone-wagons, and sleds of all kinds. The sledges used by Shackleton in his Antarctic expedition in 1908 had runners of specially selected split hickory because severe tests demonstrated that the wood wore better than German silver or other metal runners.

Some hickory is used in the manufacture of cheap furniture, especially for chair rounds. Adjustable wheel chairs and children's high chairs employ considerable hickory in their construction, and in recent years it has come into vogue for rustic furniture. Other commodities made of hickory are oil-well sucker rods, which may be 30 or 35 feet long, and the skewers used by butchers. Canes, ladder rungs, trunk slats, dowel pins, wedges, crochet rings, pins used in the manufacture of artificial limbs, and insulator pins for telegraph and telephone lines consume small amounts of hickory in widely different ways. The wood is especially suitable for the manufacture of spring bars, croquet mallets, tennis racquets and other athletic goods, and it is also excellent for fishing-rods. Some hickory is also used for crates and boxes where exceptional strength is required.

Hickory is an ideal winter fuel and the big fire-places of our forefathers burned many cords of as fine hickory



HICKORY USED FOR WHEEL RIMS

The tough hickory has always been one of the most serviceable of woods for uses requiring qualities of great resistance to heavy wear and severe strain.

as ever grew. It is just as popular for the open fires of to-day, for it burns slowly, with little smoke, making a hot, bright, companionable fire.

The nuts are the most important by-product of the hickory trees, and in the case of the Pecan, the returns from the sale of its nuts exceed the commercial value of its wood. The bark of hickory contains a yellow coloring matter which has been used as a dye, but is of small utility.

WOOD WASTE EXCHANGE

EXTENSIVE use by lumbermen and wood-working factories of the wood waste exchange conducted by the Forest Service is reported by officials who have just completed a short field study to determine the extent to which the opportunities offered are being taken advantage of. Only a small per cent of the total number of concerns listed were visited, but a comparatively large number were found to have benefited by the exchange.

Makers of wooden novelties, it is said, have been particularly successful in finding supplies of material near their plants. Other wood-working industries have been able to dispose of their waste at higher prices than they could otherwise have obtained. Many of the firms were located within short distances of each other, but until recently have had no way of getting together.

The wood waste exchange was established by the Forest Service in 1914. It consists of two lists of manufacturers, which are sent out quarterly to persons desiring them. One of these is of "Opportunities to Sell Waste," and contains the names of firms which use sawdust and small pieces of wood. This list is sent to plants having waste for sale. The other list is of "Opportunities to Buy Waste," and gives the names of concerns which have waste to dispose of.

There is no charge for the service and any manufacturer who wishes to have his name added to either list can do so by writing to the Forest Service, Washington.



Photo by Gifford for Northern Pacific Railroad

ONE OF THE BIG FEATURES OF YELLOWSTONE PARK

The terraces of the Mammoth Hot Springs change in color from time to time. Nature seems here to be possessed of that character of restlessness that prompts the housewife to rearrange the living-room furniture and the sea-shells on the what-not from time to time. At least, she does it with the brush of a master artist.

Yellowstone National Park

BY MARK DANIELS

Former Superintendent of National Parks

LIKE the Grand Canyon of the Colorado, the Yellowstone National Park has occupied the spotlight of public attention to such an extent that any attempt to add to the public knowledge of its wonders and fascinations is like carrying coals to Newcastle. However, in consideration of the fact that the public has been more or less submerged with a flood of literature and lithographs, colored by hand with hues selected from paint-pot born of a printer's imagination, further comments upon the Park based upon actual knowledge may appear less like heaping coals of fire upon the head of the long-suffering tourist. As a matter of fact, the sky over Yellowstone National Park is not shell pink, the trees are not blue, the waters of the great lake in no wise resemble red ink and the geysers do not spout streams of molten metal, as one might be led to believe from some of the railroad literature colored in the way above described. Further than this, it is quite possible to traverse the woodland trails and pass many trees without seeing a single grizzly poking his inquisitive nose from behind the tree trunk, nor do the buffaloes and antelopes crowd the tourists and stages from the highways. In fact it is quite possible to spend a delightful week in the Park without being seriously molested by "denizens of the woods," as the pseudo nature lovers delight in calling the hapless bears and other animals of the Park.

It is true that buffalo, antelope and bear abound in this largest of our National Parks, and that they may be seen without serious inconvenience or difficulty, but that they are so numerous as to interrupt one in the pursuit of insouciant pleasures, is purely a figment of the publicity expert's imagination. I remember that for years, as a boy, it was the ambition of my young life to spend a few weeks in Yellowstone National Park where a natural fleetness of foot would be greatly augmented by the exciting pleasure of dodging silver-tipped grizzlies and climbing trees to elude the vicious horns of the man-eating buffalo, and I have no doubt that there are many young boys in the United States whose sleep is filled with dreams of canyons and forests in Yellowstone National Park, over-crowded with beasts of prey.

Undoubtedly there are more natural phenomena to be seen in Yellowstone National Park than in any other equal area in the United States. Add to this the fact that there is a great lake fifteen miles wide at its widest point, and twenty miles long, the placid surface of which is seventy-eight hundred feet above the sea level, a great gorge of rainbow hues through which a mighty river roars on its way to the sea, hundreds of square miles of great forests and broken, saw-toothed crests silhouetted against the sparkling skies, and you have a combination which will inspire almost anyone to an unrestricted and

profuse use of the English superlative. In addition to the almost innumerable wonders of the Park, the locality is pervaded with an atmosphere of bigness. Everything is on a giant scale. Distances are great, canyons are of a terrifying depth, mountain peaks raise their lofty crests to inconceivable heights, and even the length of the Government roads is made inconceivably long by the intolerable dust which Congress refuses to lay for the tourist. It is not surprising, therefore, that exaggeration creeps into a discussion of the Park, and that descriptive writers take liberties with truth.

ern entrances, which are tapped by the Northern Pacific Railroad and the Union Pacific, respectively. In the early history of the Park, most of the travel came in by the northern entrance, which is but a few miles from Fort Yellowstone, where, at one time, was stationed a very considerable force of cavalry. Since that time, however, this force has been reduced and the interest in the old fort is now secondary to the greater number of imposing spectacles that may be witnessed from the main circuit, which is considerably closer to the western entrance. As a result, the tourist whose time is limited will generally



Photo by Gifford for Northern Pacific Railroad

CARELESS TOURISTS ARE INJURED HERE

While the Grotto Geyser does not present such a spectacular performance as Old Faithful, it is still one of the most interesting in the Basin. In addition, it permits of a closer inspection while in operation, a privilege that seems to be held at a premium by the tourists, who are often injured through succumbing to curiosity.

As Yellowstone is the oldest of our National Parks, it is to be expected that it is opened up with roads and trails to a much greater extent than any other Park in the system. Fortunately, a certain degree of intelligent forethought seems to have been exercised in the planning of the roads in the Park. There are four entrances, each about in the middle of a boundary line of the Park, which lead to a central circuit on which are located most of the interesting features to be visited. There is also another circuit in the northern portion of the Park, a portion of which is contiguous to the main circuit, so that the encircling roads form a figure eight. One may enter the Park, therefore, from any one of its four sides and strike the circuits, thus giving a choice of several different routes of travel.

The entrances most used are the northern and west-

choose the Union Pacific line, entering at Yellowstone on the western entrance, and make only the main circuit.

From Yellowstone the road follows the Madison River to its junction with the Firehole River, where it branches. One road follows the Gibbon River to the north, while the other follows up the Valley of the Firehole. The road along the Firehole is particularly beautiful, as it clings for miles to the very edge of the river until it reaches what is known as the Lower Geyser Basin. In this Basin are the famous Mammoth Paint Pots, which are really nothing but mud geysers, the contents of which look and act like nothing so much as vividly colored mush that is being boiled and tossed by escaping steam. In this Basin, also, are the Fountain Geyser, Emerald Lake and the Fountain Hotel. To some tourists the latter is quite the most curious freak to be found in the Basin,

although any antipathy which one may feel for its bastard architecture is soon forgotten in the delights of the well-cooked food that is served inside.

On the regular trips, the Fountain Hotel, which is only a lunch station, and the next stop, the real Mecca of Park tourists, is reached about four o'clock in the afternoon. Here are the famous Old Faithful Geyser and Old Faithful Inn at the upper levels of the Upper Geyser Basin. The two places at which most tourists spend the majority of their time are in the Upper Geyser Basin and at the Canyon Hotel on the brink of the Grand Canyon of the Yellowstone.

Speaking of architecture, it is difficult to place the Old Faithful Inn in any category, but despite its curious and rather unattractive massing, the hostelry is pervaded with an unusual amount of charm and an atmosphere of real comfort. From the windows of many of the rooms of the hotel, and from the veranda, Old Faithful Geyser may be seen to spout, with

its never interrupted regularity, at intervals of one hour and five minutes. From the veranda may also be seen many of the geysers across the road on the eastern border of the Basin, and the entire surrounding has the appearance of a manufacturing town with the innumerable jets of steam rising from unseen escapes. It has the desirable feature, however, of lacking the roar that frequently becomes nerve racking in the vicinity of the Fountain Hotel.

There are a great number of intensely interesting points of interest in the Upper Basin, prominent amongst which are the Grotto Geyser, Punch Bowl, Sunset Lake and the Rainbow Pool. However, unless the tourist is prepared to remain in the locality for twenty-four hours or so, it is quite possible that few of the geysers will be

seen in action, with the exception of Old Faithful. But the brilliant colors of the pools and hot basins alone would justify the trip if the tourist is forced, by shortness of time, to continue on schedule.

The next link in the circuit is from Old Faithful to Thumb Station on the western shore of Yellowstone Lake. The road between these two stations crosses the Great Divide twice in the journey and extends little more than this fact in extenuation of the disagreeable circum-

stances of the trip. It follows along Spring Creek and crosses the Divide in both places so easily that it is difficult to realize that there is any Divide lurking in the vicinity, particularly as the dust might make it practically impossible to see such a thing if one were still interested.

From Thumb Station, there is a choice of two routes, one by wagon road and one by launch on the Lake, to the Lake Hotel at the upper end of Yellowstone Lake. It is difficult to imagine anyone choosing the road after the ride



Photo by Gifford for Northern Pacific Railroad

THE YELLOWSTONE FALLS

These falls are not so high as many others. Compared in height with the Yosemite falls, it is equal to any. Over its precipice leaps a mighty river and, as an illustration of bounding energy, it is unexcelled. The proportions are just about right to come within the scope of human intelligence, thus making its beauty more readily grasped.

to Thumb Station, and, in addition, the boat ride is one of the most beautiful that can be had on any lake in this country. The route traversed by the launch is about fifteen miles in length, half of which is spent in the western extension of the Lake, known as the West Thumb. After passing Dot Island, the boat swings close to Stevenson Island and lands at the wharf in front of the Lake Hotel.

Here is another excellent example of the work that has been left undone by the Board of United States Geographic Names. Some of the most prominent points and features in and on this most wonderful of lakes have been named West Thumb, Rock Point, Steamboat Point, Bridge Bay, Frank Island, and, wonder of wonders, Dot Island. The latter is only exceeded in the absolute idiocy

of its cognomen by Spot Mountain in Glacier National Park. Is it any wonder that storms blow up on this Lake with such fury that they seem to be launched on to renewed violence in order that they may tear from the heart of the Lake those elements which have been cursed by man's ignorance and lack of imagination?

By most tourists the Lake Hotel is approached with a spirit of keen and trembling anticipation, for all along the line information has been slyly supplied to the effect that here will be found the monarch of the forests, and for once, this form of gratuitous information proves correct. Out back of the hotel, there is an open space where, for a number of years, the proprietors have been dumping the refuse from the dining-room. Why the dumping is done at the rear, rather than in the front, cannot be explained on any other grounds than the fact that it is closer to the kitchen, for nothing could add to the inconsistency of this combination of colonial architecture and west-

ern box wood-work painted a vivid yellow. Be that as it may, the dump grounds are well to the rear of the hotel, and for several generations of bears this area has been the dining-room of the wild animals that are so elaborately described in railroad literature. It is true that on hot days those who are enjoying a cold in the head will find their affliction a distinct advantage, unless the bears may have eaten all the refuse before it had time to give other than ocular evidence of its presence. At almost any time in the day, one or two bears may be found on the dumps, but these are invariably of the family of Black Bears. The Grizzly, it appears, is more regular in his habits and dines only between the hours of six and eight in the evening. Perhaps this regularity in habit accounts for his unusual

physical development and it is pride of race that keeps him to schedule, but in any case, it is useless to seek a glimpse of the great grizzly at any other time.

There has been for some time a mother bear and two cubs of the Black family that seem to have become more inured to the extravagance in language and dress on the part of the tourist than the other bears, for they are frequently found within a few yards of the kitchen steps of



Photo by Gifford for Northern Pacific Railroad

THE GOLDEN GATE

This is a pass through which the government road runs. It looks as much like a gate as it does like gold, and is, therefore, as well and as aptly named as almost any other prominent feature of the Park. Perhaps it should be a source of gratification that it was not named Politics Portal.

the hotel and may be snapped with kodaks, fed with cake and crusts, and otherwise annoyed, with more or less impunity. At the risk of starting a controversy over a word which has, in the minds of certain predatory corporations, been much over-used, I would suggest that the tourist carry on his annoyances of the bears within "reasonable limits." There is a story of one man who had grown so passionately fond of life in the open that he took his blankets and slept by the edge of the lake in front of the hotel. Whether his preference for this location as against a

couch in the hotel was prompted by a sincere love of nature or an antipathy for the accommodations offered, has never been ascertained, for, during the night a grizzly, smelling the bacon under his pillow, aroused him to such an extent that his movements were interpreted as threatening to all bears. Prompted, therefore, by the first law of nature, the grizzly swung on him with sufficient force to throw him completely "through the ropes" and into the Lake, some fifteen feet away, during which flight the nature lover scattered various and sundry parts of his anatomy en route. Having completed his knock-out, the bear ambled on his way, munching bacon, and the man lived only long enough to give a few meager facts of the case.

The next day's journey follows along the Yellowstone

River to the Canyon Hotel and the finest scenery in the Park is to be had in this vicinity. There is no doubt that the Falls of the Yellowstone River in this Canyon are among the finest to be seen in the world. At the Upper Falls the entire river passes over a sheer drop of one hundred and nine feet. The Lower Falls is a sheer drop of three hundred and eight feet. The Canyon, itself, is approximately one thou-



Photo by Gifford for Northern Pacific Railroad

IMMIGRANT PEAK OVERLOOKS A PEACEFUL STRETCH OF THE YELLOWSTONE RIVER

In this Park, so marked with evidences of Nature's violence, the beautiful meadows and charming valleys that are so frequently encountered fill the observer with surprise and delight. Instinctively the eye sweeps the tawny hills in search of grazing cattle.

sand feet deep, and its walls and sloping sides are of the most varied hues imaginable. It is not of a character that discourages intimacy in the way the Grand Canyon of the Colorado does, but, on the contrary, seems to invite closer association and acquaintanceship. I met Elbert Hubbard scrambling around half way down on the side of the Canyon on a hot day, and after he had finished a rather lengthy discussion of the inadvisability of admitting automobiles to the Yellowstone National Park, wiping, meanwhile, from his eyes, drops of perspiration, he told me that in all his travels he had never been in a place where intimate association with stupendous things seemed so possible or was so enjoyable. Perhaps it is well that he did not live to see Yellowstone National Park, which he loved so dearly, desecrated, as he thought it would be, by hordes of automobiles over its highways, but I am of the opinion that it is a great pity he did not live to experience a complete revulsion of feeling in this regard upon a full realization of the greater joys that automobile permits bring to the large numbers of those who delight in touring this Park. The question of admitting automobiles in the Yellowstone had been brought up prior to this time, and since I, for one, had strongly recommended their use to the Secretary of the Interior, I was therefore obliged to take issue with Mr. Hubbard on the question. However, the order admitting automobiles was given at about, or subsequent to, the time of his death, and we therefore came to no blows over the question. As a matter of fact, most of the blow-

ing has been since, for which many of those who were originally interested in the issue are profoundly thankful.

There is one trip from the Canyon Hotel, which should, by no means, be overlooked, in spite of the fact that so few take it. This is up the Mount Washburn Road to the summit of the Mountain. The regular road from the Canyon to the next station at Tower Falls traverses most of the

route, but at Dunraven Pass the road to the summit branches to the right and climbs to an elevation of approximately ten thousand feet above the sea. From this point one of the most commanding views that is to be had in the Rockies may be enjoyed, and if one is fortunate, intimate peeps of mountain sheep may be had along the road.

The Canyon Hotel is one of the stations that are on both circuits so that it is possible to return by the way of Norris Basin and see more geysers, or to continue by the Dunraven cut-off to Tower Falls, and thence to the Mammoth Hotel at Fort Yellowstone. The most popular route is by the way of Norris Basin to the Mammoth Hotel. Undoubtedly the reason is that along this route more natural phenomena are to be found, although the scenery is not nearly so good. Along the route by Tower Falls, Dunraven Pass is traversed and some petrified trees may be seen. Otherwise, there is nothing of interest save wonderful and glorious scenery which, it must be acknowledged, does not compete very successfully, for the attention of the average public, with freaks of nature.

Not that the road by the way of Norris Station is lacking entirely in scenery, for it is beautiful throughout its length from the Norris Basin to Fort Yellowstone. It follows the bed of Obsidian Creek through a more or less open country with beautiful meadows and forests on either side, and threads another pass in the mountains

where the engineering work seems to have justified that thrill of inspiration which resulted in naming the pass "The Golden Gate."

Fort Yellowstone has quite an air of romance surrounding it. It was at one time the headquarters of a large force of cavalry and housed some of the most distinguished soldiers in the United States Army, many of whom received their medals of distinction in the Indian



Photo by Gifford for Northern Pacific Railroad

NOT MANY OF THESE GREAT ANIMALS LEFT

There are but a few herds of buffalo left in the United States. One belongs to an Indian family and has been reduced in number by several recent sales to other countries than the United States. It would appear that Congress is determined to carry on the work of exterminating the buffalo that was started by the plainsmen a generation ago, for the Government has refused to do anything to prevent foreign purchase of buffalo.

fighters in the Northwest. The vacant buildings carry one back to active times and bring a blush of shame over the lack of a more intimate knowledge of American history.

One of the most interesting natural phenomena in the Park is the Mammoth Hot Springs, which is built of a number of terraces formed by the depositing of salts from solution in the hot water of the springs. The colors of these terraces change from day to day, and offer a never ending source of interest and wonderment to the visitors.

From the Mammoth Hotel at Fort Yellowstone, the tourist can depart from the Park by the way of Gardiner Station at the northern boundary, or return by the way of Yellowstone on the western boundary. It seems most advisable to take the trip from the Canyon Hotel over Dunraven Pass by the way of Tower Falls to Mammoth Hotel and out again by the western entrance, for by this route, all the roads of each of the two circuits are traversed, with the exception of a short link between the Canyon Hotel and the Norris Basin, which is, perhaps, the least interesting of the necessary links to complete the circuits, although it is more picturesque than some of the essential stretches of road.

The Park is the largest in our system and contains over two million acres. It is ridiculous, therefore, to consider that anyone can really see any material portion of its vast area in the length of time that is usually devoted to a trip in the Park; there are hundreds of miles of trails, innumerable lakes, streams and wonderful mountain peaks, together with an infinite variety of natural phenomena, all of which offer sufficient interest to entertain the most exacting for a period of several months; in fact, many tourists who wish to see the geysers have not sufficient time to take the entire circuit and are forced to enter the Park at one side or another, visit the nearest basin or two and depart. This, the Government now permits, although there was strenuous effort put forth on the part of concessionaires to enforce the tourist to stay in the Park a sufficient length of time to guarantee the operations of the concessionaires.

The introduction, therefore, of the automobile, has been a tremendous advance in the sensible administration of this Park, for it is now possible to cover by motor practically all of the roads that the Government has built in the Park in considerably less time than it would take to cover one circuit by horse-drawn stage. There is still plenty of work for the horses to do in the Park in the

way of transporting people by saddle over the trails and giving them a more detailed knowledge of the mountains, so let us hope that the good work will go on and that the roads in our parks may be made safe for the automobile travel which is undeniably inevitable.

WOOD WASTE USED FOR PULP

THE use of a steadily increasing amount of wood waste in the manufacture of pulp is indicated by figures compiled by the Forest Service. Although the pulp industry showed a decline in the last year for which complete figures are available (1914) on account of the increasing cost of raw material and general business conditions, more wood waste was used than in any previous year.

Approximately 330,000 cords of waste with a value of \$1,400,000 were utilized by 35 of the 200 pulp and paper mills of the United States. It is thought that as the price of cord wood goes up the amount of wood waste used will become greater.

The Bird Department

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THE COLORATION OF BIRDS

IF YOU have followed the hoarse song of the scarlet tanager and found him perched on some dead branch ablaze in the sunlight; if you have noted the emerald back and ruby throat of the hummingbird as he flashed through the garden; or if you have seen the indigo bird change from pale to deepest blue and then to black, you must certainly have begun to wonder at the marvels of



A RUFFED GROUSE ON ITS NEST

A good example of protective coloration. The grouse is "counter-shaded" and its color pattern is similar to that of the sticks and dead leaves about it.

bird coloration. Then if you have tramped the woods and heard the grouse rumble from the roadside and the woodcock go whistling from under your feet, or if you have tried in vain to locate the vireo singing in the tree top, you must have been struck with the law of Nature that causes her children to be clothed so differently. For the grouse and the woodcock and the vireo in their haunts are as invisible to the untrained eye as though they were but a part of the sticks and leaves that surround them, while the tanagers and hummingbirds hold the eyes of even the least observing. What, then, are the laws determining that one bird shall be clad like the sun and his neighbor like the soil? What is the reason for this brilliancy on the one hand, and how is the concealment, on the other, brought about?

We might first distinguish between the colors of a bird's plumage and the bird's coloration, because a large part of the coloration of most birds is not caused by actual pigments but more by the refraction of light

through the structure of the feathers. A scarlet tanager is red in any light because the red is a pigment, but an indigo bird or a bluebird is blue only by reflected light when refraction occurs. The only pigments that have been found thus far in the feathers of birds are reds, yellows, browns, and black. Green pigment occurs in the African plantain-eaters, but in other birds the green is due to a yellow pigment overlaid with a superstructure of microscopic longitudinal ridges or polygonal bodies that refract the light. Blue and all the metallic colors are due entirely to this process of refraction, the exposed portion of the feather being coated with a transparent colorless layer of extreme thinness ($8/1000$ of an inch) which acts like a number of prisms in breaking up the rays of light. Thus, when a blue feather gets wet or when the bluebird is perched between one and the sun, it will appear only black or brownish.

Sometimes there is an excess of black pigment in the feathers of a bird which will make it appear much darker than the other members of the same species. This is called



A MEADOW LARK AT ITS NEST

Showing the white outer tail feathers which are called "flash colors" and serve the bird in a protective way when pursued by hawks.

melanism and is better known in the familiar example of the black and gray squirrels, examples of both occurring in a single litter of young without reference to sex or vigor. The opposite of *melanism*, or *albinism*, is much more frequent and is caused simply by an absence or degeneration of pigment of all kinds. The not-infrequent white robins and sparrows or mottled birds with patches of white feathers are explained in this way and are due to inbreeding or some other weakness.

But to return to the gorgeous tanagers and the inconspicuous grouse, surely there is some reason for the difference in coloration which study might lead us to understand. We soon discover that brilliant color in almost every species is restricted wholly to the male bird and a moment's thought convinces us that the law of "The Survival of the Fittest" would soon weed out any brightly-colored females should they arise, by drawing attention to their nests and inviting the destruction of their offspring. The very exceptions to the rule further substantiate it, for when bright colors are normal to the females, as in the kingfisher and red-headed woodpecker, nature protects the offspring by causing the eggs to be laid in holes in trees or tunnels in the bank where the female is entirely hidden from sight while incubating.

Another means of protecting conspicuously colored birds is by endowing them with extreme wariness and it



THE KING BIRD AT ITS NEST IN ORCHARD

The king bird is sometimes called "Bee Martin" because of its supposed habit of destroying honey bees. Investigations have shown that it catches but few bees and these mostly drones, and that it is a highly desirable bird because of the objectionable insects which it destroys and its habit of driving off crows and hawks.

is seldom that any one of them will allow as close an approach as do their dull-colored mates and relatives. They seem to realize that they are conspicuous and rely upon their alertness to escape. Moreover, is it not of direct benefit to the species that there should be a conspicuous decoy to lure away from the vicinity of the nest any enemy that should pass that way?—for even should the male be seen and captured, the offspring might still persist.

Brilliance of plumage probably originates in every species through excess of strength and bodily vigor, and this fact undoubtedly tends to perpetuate and increase the brilliancy, whenever the bright colors are not directly disadvantageous to the species, by assuring to the brilliant, vigorous bird the best mate and strong offspring. Then

it may well be asked why the males of all species are not conspicuously colored and able to rely upon their wits to escape their enemies. But think for a moment which are the brightly colored birds and which the dull. The tanagers, the trogons, the honey creepers, the tropical flycatchers, the buntings, the gulls, the terns, the herons and the flamingoes are all birds that spend their lives either in the tree tops or in the great open spaces where enemies cannot lurk. The nearer the ground a bird



A LEAST BITTERN ON ITS NEST—IN CATTAILS OF THE MARSH

An example of *mimicry* among birds—the shape of the bird in this posture, as well as the color, simulating its haunts, so that it is most difficult to see it among the cattails.

dwells and the denser the coverts, the nearer may an enemy approach and the more easily may it lie concealed. Thus it is clear why the gaudy tanager is confined to the tree tops and why the streaked sparrow must simulate its dry grass haunts if it would persist. Birds dwelling within reach of skulking enemies seldom wear brilliant colors or bear feathers that are continuously conspicuous. They are protectively colored and often fit in with their environment to such an extent as to be practically invisible. The ways in which this concealment is brought about are varied and interesting.

CONCEALING COLORATION

There is one principle which underlies the coloration of all protectively marked birds which does more than anything else toward rendering them inconspicuous, and that is the principle of *counter-shading*, as it was named by its discoverer, the artist-naturalist Abbot Thayer. It had long been known by artists that to make objects appear solid and conspicuous on the canvas one must paint in their shadows, but it remained for Thayer to

apply the reverse of this practice and to point out that the way to make solid objects appear flat and inconspicuous was by painting out their shadows. He applied this principle to the coloration of animals and recognized that the protective coloration is brought about largely by animals being colored lightest on the throat and belly, which parts are thrown into the deepest shadow, and darkest on the head and back which receive the greatest light. Be-



Photo by H. D. Reed

FIND THE SECOND BIRD MODEL

Two models were placed side by side on the gravel path. One was painted uniformly and the other was "counter-shaded" like a real bird. The "counter-shading" has rendered the second model almost invisible, and as only a very sharp eye can see it, it is perhaps well to explain that it is directly behind the plainly visible model.

tween the back and the belly there is a gradual change to the lighter, exactly counter-matching the amount of shadow, so that the solidity of the bird is "painted out," so to speak.

This principle has been well illustrated by the celebrated bird artist, L. Agassiz Fuertes, with the two models here shown. Two blocks of wood were cut out in the general form of a bird and colored uniformly dark. He placed them out-of-doors on a gravel walk in good light and then with his brush proceeded to paint out the shadows on one of them by adding touches of white paint so as to just balance the shadows, with the result that this one eventually disappeared from view.

The principle of "counter-shading," like other great discoveries, is very simple. The human eye and probably all eyes judge the solidity of an object by the shadows which it casts, and an object which throws no shadows upon its underparts has no solidity. Through *counter-shading*, then, the bird appears flat and when it does so, it falls off into the background and becomes a part of it. If, in addition, its color pattern is similar to its haunts, it becomes practically invisible. And so we find the grouse and the woodcock, living on the forest floor, with a color pattern of spots and patches of light and dark brown; the sparrows and meadowlarks of the fields are streaked with buffy and rufous, like the dead grasses; the bittern

of the marshes is striped like the shadows and lights of the cattails, and the sandpipers and plover are speckled like the sand of the sea shore.

With insects this simulation of pattern is often carried to the extreme. There are butterflies and moths whose markings imitate exactly the dead leaf or the bark upon which they rest and even the shape of the wing is modified to make the simulation more complete. This scheme of Nature is called *mimicry*. With birds *mimicry* is much less perfect, but the screech owl, with its feathers drawn close and its ear tufts erect, certainly simulates very well a broken piece of bark. The night hawk, sitting lengthwise on the limb, looks like the broken stub of a branch and the least bittern in the marsh, with its bill pointing toward the zenith, the feathers of its long thin neck drawn tight, resembles a broken reed; so much so, in fact, that they will often remain on the nest in this posture until almost touched.

In the plumages of certain birds that are normally very difficult to see when at rest, we find a very different



FIND THE KILLDEER

The killdeer has some very conspicuous markings, but is difficult to see in its haunts because these "ruptive marks" break up its continuity and render it unbirdlike.

color pattern which seems at variance with all that has been said. Instead of there being a gradual transition from the dark to the light areas, there is a sudden abrupt change, often heightened by a black border. On the head of the wood duck, for example, the white of the throat extends up on the cheeks in the form of crescents. These, together with the white stripes through the crest and the black and white bars on the sides, would seem to make it most conspicuous. Similarly with the killdeer, its brown head is separated from its back by a conspicuous white ring and its snowy breast is crossed by two coal black bars. In spite of these marks, one finds that both the wood duck and killdeer in their natural environments are very inconspicuous, and we are led to believe that these *ruptive marks*, as they have been called, serve apparently to split up the bird into several pieces, destroy its continuity of form and thereby conceal it by making it unbirdlike.

One other class of markings we might consider here since they are similar to the ruptive marks in being them-

selves extremely noticeable. I refer to the so-called "flash colors" or "banner marks." The white tail of the deer and the cottontail, which are raised and made as conspicuous as possible when the animal is fleeing; the white outer tail feathers of the junco; the white patches on the tail

So much then for concealing coloration among birds. Some authorities have claimed that all birds are protectively colored, and it is true that we as yet know too little of the struggles that go on between the birds and their enemies to interpret everything that we find in their



THE DECEPTIVE WHITE AND BLACK

A close view of the killdeer at its nest, showing the "ruptive marks." The downy young crouching beneath the parent bird likewise has these marks.



A WOOD PEWEE AT ITS NEST

Showing the broad, flat bill and the erect posture typical of members of the Flycatcher family. The shallow nest is covered with lichens to make it even more inconspicuous.

of the meadowlark, and the white rump of the flicker, all fall in this class. These marks were at one time supposed to serve as signals to the young or to others of the species to keep the flock together, but Dr. C. H. Merriam has suggested that they may even better serve to give protection from their enemies. When the animal or the bird is fleeing, the eye of the enemy naturally fastens upon the very conspicuous flash color and when, suddenly, the meadowlark, for instance, drops into the grass, or the flicker claps up against the side of the tree, the banner mark suddenly disappears, but the eye, through the persistence of vision, follows on in the same direction in which the bird was going before realizing that it has stopped and, in the interval elapsing, the bird slinks off a few feet further or slips around to the other side of the tree and is nowhere to be seen.

coloration and to find a use for everything that we see. It is here that the field naturalist and the woodsman by intelligent observation can help to interpret what at present seem like vagaries of Nature. That some birds are conspicuously colored there is no doubt in the minds of most of us. A crow on the snow or against the sky, or anywhere except in the coal hole, is bound to be visible from any angle. But the crow has been endowed with an intelligence and a wariness which need no concealing coloration to supplement them.

The problems of the differences in coloration between males and females and young of the same species, the changes from bright to dull colors and vice versa, we can better consider at another time.

The Classification of Birds

WITH this issue we begin a series of articles on North American Birds intended to supplement those of a general nature which will continue to appear. It would obviously be impossible to treat each of the nearly 800 species found in United States and Canada and we must, therefore, consider them by families, emphasizing and illustrating some one member of each. Before so doing, however, it may be well to say a word about what we mean by a "bird family" and explain briefly how birds are classified.

The classification of birds does not differ materially from the classification of other animals or of plants, and

one familiar with any classification would find little difficulty in understanding the nomenclature of ornithology. All birds belong to the Class Aves, which is one of the five divisions of the *Phylum Chordata*, or backboneed animals, the others being Pisces, or fishes, Reptilia, or reptiles, Amphibia, or frogs, toads and salamanders, and Mammalia, or mammals. The Phylum Chordata, together with others such as the Protozoa (one-celled animals), Cœlenterata (corals, etc.), Mollusca (clams, etc.), Hexapoda (insects) and others make up the Animal Kingdom. The Class Aves is usually divided into twenty-one Orders, seventeen of which are found in North America. Among

these are the Orders of Diving birds, of Shore birds, of Wading birds, of Waterfowl, of Perching birds, etc., and they are usually arranged serially to indicate their place in the scale of evolution, the Diving birds being the lowest and the Perching birds the highest.

The Order of Perching birds, or sparrow-like birds, contains nearly half of the known species of birds and has been divided into 65 families, 22 of which have representatives in United States and Canada. These we shall consider first, beginning with the family Tyrannidæ or New World Flycatchers.

THE FLYCATCHERS

The true flycatchers, or tyrant birds (family Tyrannidæ), are confined entirely to North and South America, where over 400 species occur. The European flycatchers belong to a very distinct family (Muscicapidæ) differing, among other ways, in being true singing birds, our American flycatchers lacking the vocal structures typical of true song birds. As a result, none of them have true songs, although many of them, like the kingbird, are noisy birds, and a few, like the wood pewee, have very sweet whistles.

The majority of the flycatchers live in the tropics, but among them are numbered some of our best known birds, including, in addition to the kingbird and pewee already mentioned, the phœbe, the crested flycatcher and the least flycatcher. They are mostly small dull-colored birds with typical flycatcher structure and habit. Their bills, for example, are broadly triangular, wider than high at the base and armed with stiff bristles at the corners, efficient structures for snapping passing insects from mid-air. They sit more erect than most birds, usually on some dead branch or other exposed perch from which they can survey the country and dart out after passing insects.

Their nesting habits show considerable variation. The phœbe builds a bulky affair of mud and moss on the cliff or under the bridge, the kingbird builds of roots and wool in the orchard, the crested flycatcher builds in a hole in a tree, and for some strange reason, invariably includes the cast skin of a snake, while the pewee, building a shallow compact affair saddled on a branch, always covers the outside with lichens to make the nest inconspicuous.

Many of the tropical flycatchers and some of the species of our own Southwest are showy birds and often have the broad bill or other parts specialized to a ridiculous extreme. The vermilion flycatcher is of a most brilliant red with darker wings and tail, and the scissors-tailed flycatcher is largely white with a light gray back and scarlet patches on the head and beneath the wings, and the outer tail feathers are greatly elongated, seven to ten inches in length.

All of the flycatchers are insectivorous and extremely beneficial birds. The kingbird has been said to destroy honey bees about apiaries, but investigations have shown that the few bees which it does eat are usually drones, and in all other respects he is an extremely useful bird. Particularly about the poultry yard is he a desirable tenant,

for he is the self-appointed policeman of the district. No crow or hawk can approach without arousing his ire and being promptly driven off.

The pewee and the phœbe, and all the others, are invaluable allies, particularly because of the large number of moths which they destroy, the larvæ of which, like the



CROWS FEEDING

A crow, on the snow or against the sky or anywhere except in the coal hole, is conspicuous from any angle. But the crow has been endowed with an intelligence and a wariness which need no concealing coloration to supplement them.

cut-worm and the tent caterpillar, are potential armies of destruction against the agriculture and the forests of our country.

Being so largely insectivorous, the species which inhabit Northern United States are naturally highly migratory, and with the failure of their food supply and the approach of winter, the phœbe is the only one which remains in the United States north of Southern Florida. The others cross the Gulf of Mexico or the Caribbean Sea to Central America and Northern South America.

ATLANTIC COAST NATIONAL PARK

PRESIDENT WILSON, at the instance of Secretary Lane of the Department of the Interior, has created by proclamation the Sieur de Monts National Monument on Mount Desert Island, Maine. By this act he enables the Department of the Interior to realize its long-time purpose to extend to the people in the east of the United States the benefits of the national parks service. This is the first national park east of the Mississippi River.

The new national playground is already known to many thousands for its majestic beauty. It embraces more than five thousand acres of rugged mountain, directly south of Bar Harbor. In fact, its northern boundary lies within a mile of that famous resort. On the east it touches the Schoonerhead Road. On its south it approaches within a mile of Seal Harbor. It lies less than a mile northeast of North East Harbor. It is surrounded, in short, by a large summer population.



Wild Black Currant

Smooth or Northern or Hawthorn Gooseberry

Skunk or Fetid Currant

Dog Currant or Prickly Gooseberry

Swamp Red Currant

Swamp Black Currant

Eastern Wild Gooseberry

DISTRIBUTION OF VARIOUS SPECIES OF CURRANTS AND GOOSEBERRIES IN NEW ENGLAND, ADJOINING STATES AND CANADA

The Alternate Hosts of the White Pine Blister Rust

By LAWRENCE R. GROSE, M.F.

The white pine blister rust which threatens pines in Eastern States valued at \$186,000,000 and in Western States at \$240,000,000 is caused by a fungus. Wild and cultivated red currant and gooseberry bushes are essential to the spread of the disease. The easiest symptoms of the disease to detect are perhaps the irregular swellings in the bark which may appear at any time from a few months to six years after infection. In the spring the fruiting bodies of the parasite thrust themselves from within through the swollen bark and form whitish blisters as large as a child's finger-nail. After a few days the blisters break and disclose bright yellow dusty spores. These are blown about by the wind, but in order to perpetuate themselves must alight on the leaves of currants or gooseberries. A healthy pine cannot itself be infected directly by spores from another tree.

An examination of near-by currant and gooseberry bushes is therefore essential in ascertaining the extent of the disease. From June 1 till the time the leaves fall, the bushes should be searched for the mealy yellow masses which, hardly larger than a pinhead, may yet be so abundant as to cover a large part of the lower surface of the leaf. Later in the fall there are short hairy outgrowths. These also are on the lower surface of the leaf. If the symptoms are found, notify the State or the United States Department of Agriculture and take the advice which will be given. The disease has already appeared in Massachusetts, New Hampshire, Vermont, Connecticut, Maine, New York, Pennsylvania, Rhode Island, New Jersey, Wisconsin, Minnesota and parts of Canada. This article, describing red currants and gooseberries, will be useful in detecting the disease.

THE EDITOR.



IN NEW ENGLAND, adjoining states and part of Canada, which are now feeling the attack of the white pine blister rust, there are several kinds of wild gooseberry and currant which the rust can adopt as alternate hosts in its curious dual life-history.

Perhaps the commonest of these is the dogberry, or prickly gooseberry (*Ribes cynosbati*, L.). This is a low, straggling shrub, two or three feet high, usually found growing in rocky woods, but thriving also in a variety of other places. Its leaves are simple and alternate, ordinarily occurring, except on the youngest shoots, in groups or bundles of three or four, arising from a common point on the stem. They are lobed and toothed, and somewhat suggest the maple type of leaf in outline, though more rounded, more blunt-toothed, and less deeply cleft. At the base of the leaf-clusters the stem is armed, in most cases,



WILD BLACK CURRANT
(One-half life size)

Showing the fruiting spray and flower. This plant is common in wet woods and low grounds chiefly throughout New England and New York.

with spines, and the stem bears scattered bristles. The bell-shaped, greenish or dull purple flower is likewise armed with prickles, which remain about the fruit.

A frequent neighbor of the dogberry is the smooth, or hawthorn, or northern, gooseberry (*Ribes hirtellum*,



SKUNK CURRANT
(One-half life size)

The fruiting spray and flower. This is frequent on cool, moist, rocky hill-slopes and mountainsides, chiefly in New York and western and northern New England.

Michx. = *R. oxyacanthoides*, L.). It is not quite so widely distributed as the dogberry, but it is not hard to find, if one looks in wet woods and on low grounds, where it prefers to live. In habit it is a small spreading shrub



SMOOTH WILD GOOSEBERRY
(One-half life size)

Showing the fruiting spray and flower. This occurs in all sections of New England and New York in wet woods and low grounds.

Along roadsides, and in thickets and open woods near dwellings, there may sometimes be found garden gooseberries thriving in the wild state. These are enough like our native ones to be confused with them by the inexpert. Nevertheless, no attempt will be made here to name the points of distinction, since any one familiar with the native species will recognize the garden varieties, and that is, for the present purpose, sufficient. Aside from the two species described above, no native gooseberries occur commonly in western Massachusetts.

The blister rust, however, takes as readily to currants as to gooseberries. The commonest of these is the skunk or fetid currant (*Ribes prostratum*, L'Her. = *R. glandulosum*, Grauer), so-called because of the unmistakable odor of its stems, roots, and fruit. It flourishes on cool, moist, rocky hill-slopes and mountain-sides. In habit it is recumbent, with spineless stems that run along under the leaves, and send up frequent shoots. Its leaves, as in the case of all members of the *Ribes* genus, are alternate and usually in bundles. They strongly suggest the maple shape. The flowers and the fruits of skunk currant, as of all currants, grow in racemes or long clusters with a central stem to which the individual

flowers or berries are attached by short stems. It will be noted in the illustrations that the fruits of the gooseberries occur commonly in twos and not in clusters. The flowers of the skunk currant are small, greenish, and bell-shaped;

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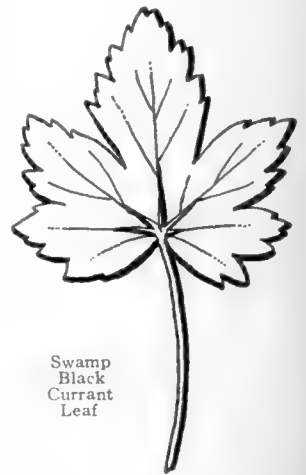
Eastern
Wild
Gooseberry
Leaf



Smooth or
Hawthorn or
Northern
Gooseberry
Leaf

the fruits are a pale red, and they are covered with soft bristles. In winter, this plant is the one conspicuous member of its genus, because of its handsome red buds.

Another common currant is the wild black currant, *Ribes americanum*, Mill (= *R. floridum*, L'Her.), which closely resembles the black currant of gardens. Its leaves are distinctly maple-like, with a large and elongated central lobe; and they are dotted with resin spots. The clusters of skunk currant are comparatively erect; those of wild black currant are markedly drooping. The flowers are pale green, yellow, or white, the fruits black and smooth. This currant prefers non-rocky sites and rich soils near streams.



Swamp
Black
Currant
Leaf

In addition to the skunk and black currants, there may be found in limited parts of the region under consideration the swamp red and the swamp black currant (*Ribes triste*, Pall., and *R. lacustre*, Poir.). Both grow in swamps, in the coldest and wettest woods, and in sub-Alpine sites, high grounds which have in their influence on plant life a likeness to cold and swampy lowlands. Both also are northerly plants, and in Massachusetts are not far from their southernmost extension. The swamp red currant has large and conspicuous yellow-green flowers and smooth red berries. The stems are straggling or reclined and from three to five feet long. In all respects this currant is very like the garden red currant. The swamp black currant, *Ribes*



PRICKLY WILD GOOSEBERRY
(One-half life size)

Showing the fruiting spray and flower. This is very common in New York and northern and western New England, chiefly in rocky woods



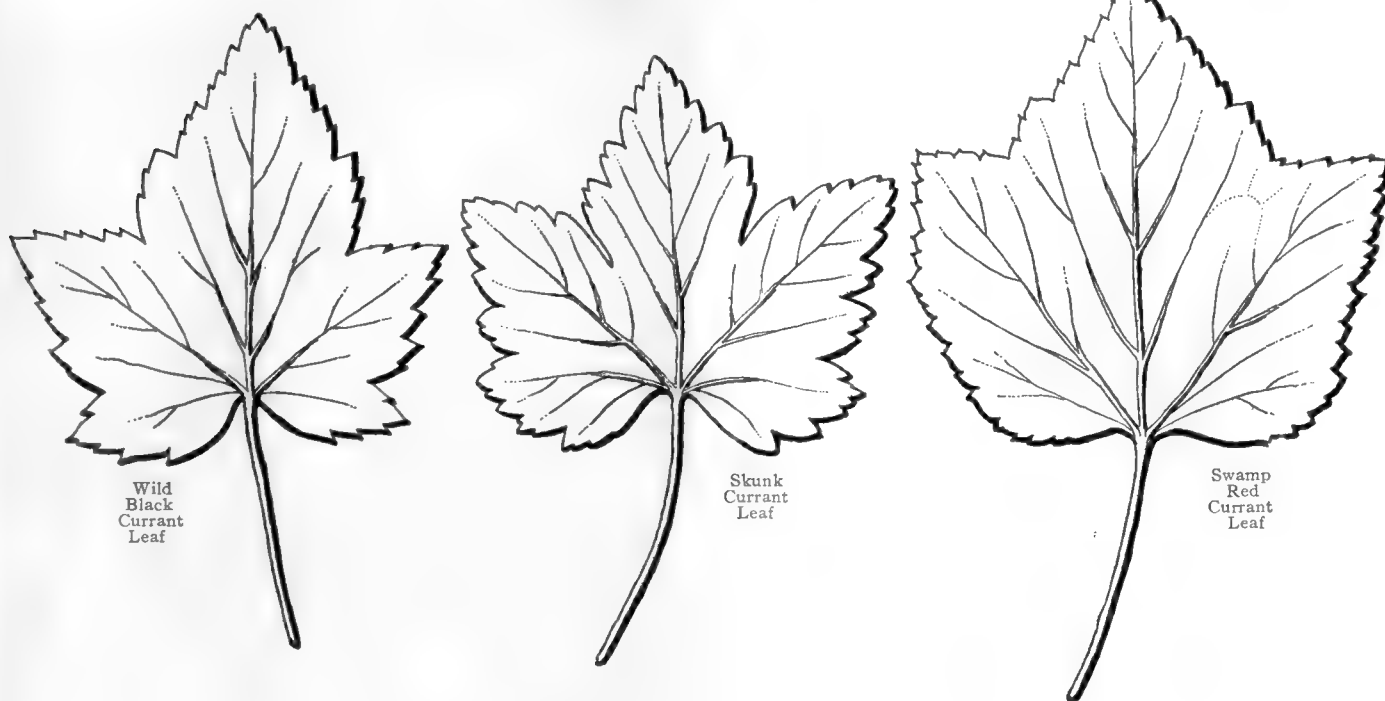
Dog Currant
or Prickly
Gooseberry
Leaf

lacustre, has deeply-cut five-lobed leaves, greenish flowers in clusters, dark purple bristly fruit and a prickly stem. In the grouping of its characters it is obviously peculiar among its kind, with the clusters of a currant and the prickliness of a gooseberry; and rival botanists leave us the choice of calling it by either name.

Garden currants, like garden gooseberries, frequently escape to roadsides, thickets, and open woods. They may

dogberry, in the parts of Connecticut in which much pine grows. The occurrence of all of these species is not as continuous as the maps, owing to their smallness, must suggest; but wherever within the shaded areas the favorable sites exist, they are almost certain to be.

Furthermore, nearly all the New England and New York species have ranges extending far to the north and west, swamp red currant, swamp black currant and skunk



be confused with native kinds, but not easily with plants of any other genus. Taken separately, the leaves of some hawthorns, of nine-bark, of maple-leaved viburnum and high-bush cranberry might suggest their leaves, but the recollection that their habit is low, straggling, or recumbent, and that their leaves are alternate and, save on young shoots, typically in bundles, will serve to keep this genus distinct from others. Ordinarily, currants and gooseberries bloom in May and June and form fruit in July and August. Species preferring comparatively warm sites may bloom in April.

Given a foothold, the blister rust will find means of spreading in any region. The accompanying maps indicate the range of the various currant-gooseberry species in the rest of New England and states immediately to the west. All the species common in the Berkshires are common also in New York, Vermont, New Hampshire, and Maine; New York has an additional species, the round-leaved or Eastern wild gooseberry (*R. rotundifolium*, Michx.), said by some to cross the Massachusetts line; and the northern New England states have the skunk, swamp red, and swamp black currants in even greater abundance than has Massachusetts. There are quantities of smooth gooseberry and wild black currant in eastern Massachusetts, and some of both of these, along with

currant running clear to the Pacific, and wild black currant, dog currant, or prickly gooseberry, and smooth, hawthorn or northern gooseberry growing throughout the Great Lakes region and well beyond the Mississippi. To the west and north there also occur several other native species. The currants and gooseberries are common in nearly all parts of the north temperate zone; and out of a total of one hundred and twenty species and sub-species, seventy occur in the United States. In whatever part of our country the five-needle pines exist, some one of the currants or gooseberries will be found not far away.

NOMINATE FRIENDS FOR MEMBERSHIP

The Association wishes to add Five Thousand Members to its list before the end of this year.

To do this it must have assistance from its present members. If they will kindly send to the office names of friends they wish nominated, these friends will be sent sample copies and descriptive circulars.

These names should be sent in at once.

See the Premium Offer on Table of Contents page.

White Pines of Lenox Menaced

REPORTS of the general prevalence of white pine blister rust in the vicinity of Lenox, Massachusetts, have aroused deep concern for the safety of the white pine trees that contribute so largely to the notable beauty of this aristocratic centre of the Berkshires. During May and June of this year, many infected white pines of all sizes and ages were found in this region. The limits of the area of infected pines are represented in the accompanying sketch by the solid heavy line. Small trees were destroyed, and the diseased branches of larger trees were cut and burned. Since some of these trees had diseased branches, 60 or 70 feet above the ground, this was not an easy task. Late in May the early summer stage of the blister rust began to appear on the leaves of currants and gooseberries, and before the end of June, the late summer form (the stage which, in the fall, infects neighboring white pine trees) was found.

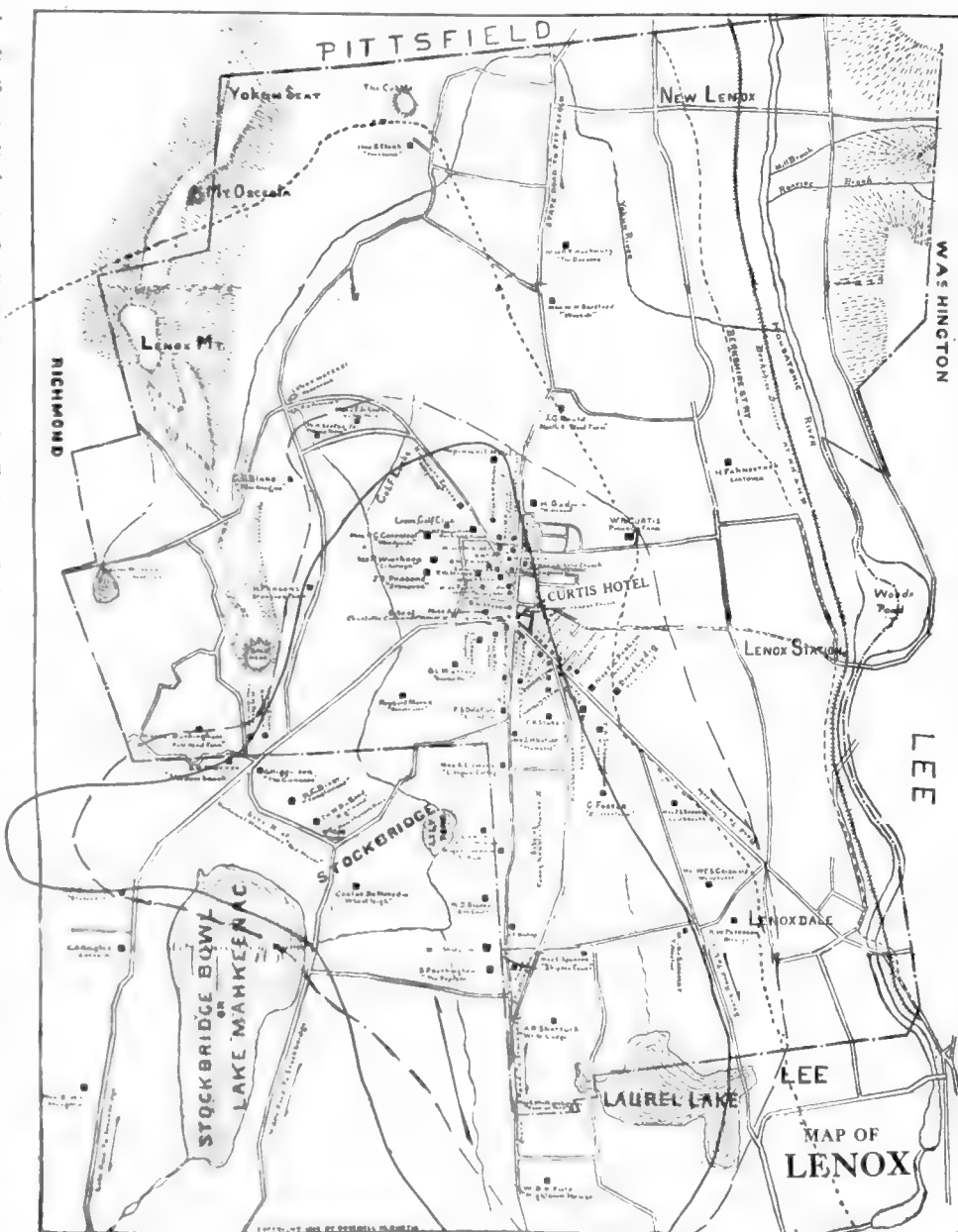
The territory in which currants and gooseberries are now infected with the blister rust is outlined on the map by the heavy dotted line. Scouting for the blister rust is being done by a force of men working under a cooperative agreement between the Massachusetts State Nursery Inspection Service and the

United States Department of Agriculture. Under the authority of the Massachusetts law, the diseased currants and gooseberries are being eradicated by State employees as rapidly as possible. The area in which affected bushes have been removed is shown on the sketch by the broken line. The magnitude of this work lies chiefly in the time and labor necessary to locate and exterminate the wild currants and gooseberries that grow in the woods by thousands.

Conditions last spring in an infected area near Ipswich, Mass., have demonstrated that there is no hope for white pine trees that have been long exposed to the spores, blister rust maturing on nearby currant and gooseberry bushes.

For the first two or three years after a white pine tree is infected with this fungus, the presence of the disease may not be apparent, but its effects are just as deadly as the action of chestnut blight on chestnut trees.

Many noted writers have extolled the charms of the trees of Lenox. Henry Ward Beecher admired them and in his "Star Papers" writes: "Our first excursion in Lenox was one of salutation to our notable trees. We had a nervous anxiety to see that the ax had not hewn,



MAP OF LENOX, MASS., SHOWING AREA OF WHITE PINE BLISTER RUST

- Boundary of area of pines infected with white pine blister rust.
- Boundary of area of currants and gooseberries infected with white pine blister rust.
- - - - - Boundary of area from which diseased currants, gooseberries and pines have been removed.

nor the lightning struck them; that no worm had gnawed at the root, or cattle at the trunk; that their branches were not broken, nor their leaves falling from drouth. We found them all standing in their uprightness. They lifted up their heads toward heaven, and sent down to us from all their boughs a leafy whisper of recognition and affection. Blessed be the dew that cools their evening leaves, and the rains that quench their daily thirst! May the storm be as merciful to them when, in winter, it roars through their branches, as is a harper to his harp! Let the snow lie lightly on their boughs, and long hence be the summer that shall find no leaves to clothe these nobles of the pasture!"

The "Hawthorne Pines" stand sentry over the site

of the "little red house" where Nathaniel Hawthorne wrote "The House of the Seven Gables" and "The Wonder Book." Fortunately, these pines have not yet shown signs of being attacked by the blister rust, although they are within the limits of the area where diseased trees have been found. It would be interesting to read what Beecher, Hawthorne, Catherine Sedgwick, Oliver Wendell Holmes, James Russell Lowell, Edwin P. Whipple, J. T. Headley, J. T. Fields, and the other masters of words, who once lived in the vicinity of Lenox, would have written had the white pine been menaced in their day as it is now. To them the trees of the Berkshire Hills were delightful, loved friends, and one can imagine them exerting their pens to the mightiest efforts in pleas for concerted action in warding off the devastation that threatens.

\$3,000,000 FOR NEW ENGLAND AND APPALACHIAN FORESTS

AN APPROPRIATION of \$3,000,000 for continuing the purchase of forested lands at the head-waters of navigable streams in New England and the Southern Appalachians is assured for the next two years. The amendment to the Agricultural Appropriation Bill, providing for this money, \$1,000,000 for the present fiscal year and \$2,000,000 for the next, passed the House on Friday, August 4, and will become a law as soon as it is signed by the President.

Thus ends, successfully, a long continued effort by the American Forestry Association, its members, and a large number of actively coöperating organizations, to have Congress provide for the continuation, under the provisions of the Weeks Law, of this work, which has been so ably done during the last several years by the Forest Service.

The various stages of this campaign have been described in previous issues of AMERICAN FORESTRY. First, in the summer of 1915, the American Forestry Association decided to devote itself to the effort to have an appropriation bill passed. A meeting was held at Washington, D. C., of officers, members of the Association, and representatives of coöperating organizations, and a plan of work decided upon. On September 23 a memorial urging the appropriation was presented to Secretary of Agriculture Houston. Then followed the task of keeping the public and members of Congress informed of the necessity for the appropriation, of enlisting the aid of Boards of Trades, Chambers of Commerce and other bodies.

On January 28 of this year there was a special hearing before the Agricultural Committee of the House on the measure and powerful arguments favoring it were presented. Later, however, this committee, by a vote of 8 to 7, decided not to include the appropriation in the Agricultural Appropriation Bill and it was not in it when the bill passed the House. This was a big disappointment and a serious set-back. However, Senator Gallinger of

New Hampshire consented to introduce in the Senate an amendment to the bill, and the Appalachian measure, as it has been generally called, was given new life. The Senate adopted the amendment. It went back to the House with the Agricultural Bill. The House refused to concur in the Senate amendments, and sent the bill back. The Senate changed some amendments, but did not alter the Appalachian one, and all went back to the House. The American Forestry Association thereupon sent letters to members in town and telegrams to those out of town asking them to be present when the vote was taken.

In the meantime, Chairman Lever of the House Agricultural Committee, and other representatives and senators in favor of the amendment, had urged upon members of the House the desirability of continuing the work and the necessity for the appropriation in order to do so, and finally when the bill came up on August 4 the amendment passed.

The American Forestry Association wishes to express its appreciation of the aid given by coöperating organizations, by interested bodies and by individuals in all that was done to secure this appropriation. There will now be added to the forested lands already secured by the Government in the New England and the Southern Appalachian regions a considerable area of very great value in protecting the head-waters of streams and in providing for forests in the future in a number of states where the forests have been seriously depleted and where new forests are a vital necessity.

During the few years that money has been available for this purchase, the work has been done by the Forest Service in a highly efficient manner. Lands have been acquired at low prices in areas where such holdings will be of the greatest public service, and the whole area purchased has been included in the Appalachian National Forest, of which Wm. L. Hall, who has had charge of the work since its inception, is the district forester.

Forestry for Boys and Girls

by Bristow Adams

About Swimmin' Holes and Such



YOU put the boys in last time," said the older girl, "and it seems to me that girls ought to be in. You know it is 'forestry for boys and girls.'"

"Yes; but that was about fishing. And you don't care so much about fishing as they do."

"But we care about the trees and the water just as much as they do. And we use the water more than they do."

She had me there. When I thought of all the times—indeed before every meal—that the boys had to be strongly reminded that water was needed on their grimy paws ere they could come to the table, I had to give up. Even then the older girl pressed her advantage, and the younger, also, chimed in:

"Besides, we can swim all over the pool under the big waterfall, and the boys can't. The water means more to us than it does to them. So you've got to give the girls a chance."

"But, you must remember, I'm not supposed to tell things about boys and girls—only about trees and forests."

"Then," said the younger, with a gleam of triumph, "what did you say anything about the boys for last time?"

"That," I replied feebly, "was to add Human Interest."

"Well, aren't we Human Interest?" chimed in both girls at once.

So, of course, I had to let them have their way, and to own that even the poets say "there isn't any story till the girl comes in!" Then they proceeded to dictate what I had to say, following up their victory. It was about like this:

"Tell those other boys and girls that

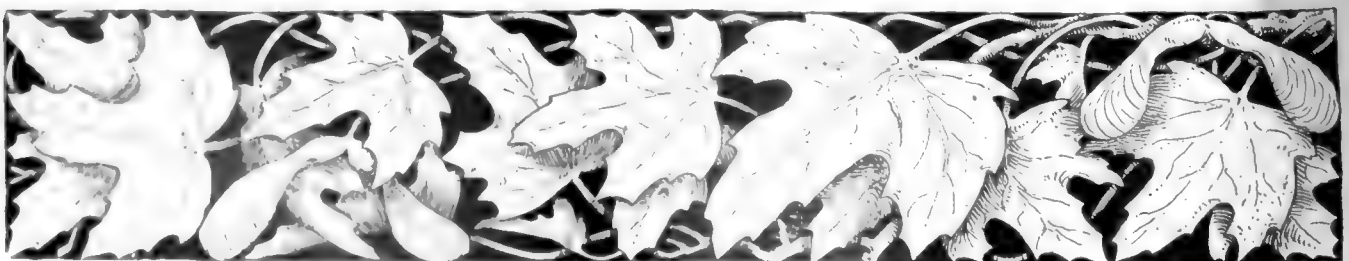
we believe in trees, and that we know that we would not have any swimming holes if it were not for the forests."

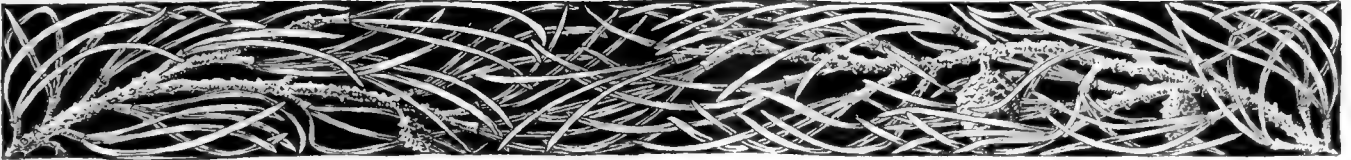
INDEED it is true. In our own creek, which flows so clear all summer long, there might be holes under the waterfalls, but if there were no trees along the upper part of the stream, there would be a heavy run-off after each rain, with mud to fill up the stream-bed, and to make the bottom slimy and slippery. Then, when the hot weather comes, and only a little rain, the stream would stop flowing, and what few pools were left would be stagnant and warm, and covered with green scum, instead of being cool and clear and fresh.

But it isn't only the swimming and the fishing that suffer from a lack of forests and a resulting bad effect on the streams. Think of all the other uses of water! Not counting the water which acts on mill wheels and grinds grain, or runs saw-mills, or even makes electricity to light cities, to move electric cars, to heat buildings, to turn machinery, to bake biscuits, and to do all sorts of other things! Not counting rivers and canals for the passage of boats! But just think how we need water in our houses, for drinking and for washing ourselves and our dishes, our floors, and our clothes! Wouldn't we be in a bad way if we didn't have fresh, pure, clear, clean water?

TO be sure of such water we need the forests. In the West, not less than twelve hundred towns and cities get their water supplies from the tree-covered slopes of the National Forests. In the East, many of our cities, like Boston, have their forests to protect and to keep steady and pure the city's supply of water.

Then, if we cut off our forests will we





have less water? We may not have any less falling from the sky, but there would be a lot less of the kind of water we wanted, when we wanted it.

Indeed, some folks say that the cutting down of the trees in certain parts of the country has cut down the water supply at the same time. They say that the earlier homes in the northeastern parts of this country were built near convenient springs. In the course of time, with forests cleared away to make room for fields, these springs dried up. Then shallow wells were dug, and these, too, failed, and had to be drilled or dug deeper.

OUR water supply is of two parts: that constantly in use on the surface, in the shape of rain, fog, snow, and dew; and that which is stored in the ground. Usually there is not enough of either kind alone for all of man's needs—to grow his crops and to do other work for him. Each part helps the other out, and the part which has been adding up in the ground in years of much rain helps out the surface supply in years of little rain. Of course, the forests form an important part of these reservoirs.

Measurements taken in wells in ten states show that in about half of the wells measured the water level had dropped. This is due, it is thought, to more demands on the water to grow our grains, to furnish drink for man and animals, and to serve many needs which did not exist when the wells were first dug. But only a third of the water loss can be accounted for in these new demands. The greater part of the loss of the rest has been due to the cutting away of the forests where they could and should have been left.

The trees were not there to check the storms and snows and to hold them until their waters sank into the ground. The spongy leaf litter in the woods was burned away, gullies were formed and drained out the water that ought to have remained under the ground. One of the remedies for this is to keep the forests growing on the hillsides, at the heads of the streams.

THEN will we always have 'swimmin' holes'?" asked the older girl.

"Then you will always have 'swimmin' holes,'" I replied. "And if the trees are kept growing, and the streams are kept running, even the two littlest boys who haven't yet learned how to swim, will be able to come back when they are grown-ups, and find the old swimming hole again. Unless"—and I think of one swimming hole I used to know—"unless some big city has reached out and covered over the old swimming hole, and turned it into a sewer."

THE swimming hole used by my own children is better than any I ever knew. My first was in a little country "run." With a deal of labor I dammed it to make a waist-deep pool. Here I learned to swim. What a thrill in the discovery that one can actually keep up without even a toe on the bottom! Life holds few such triumphant moments.

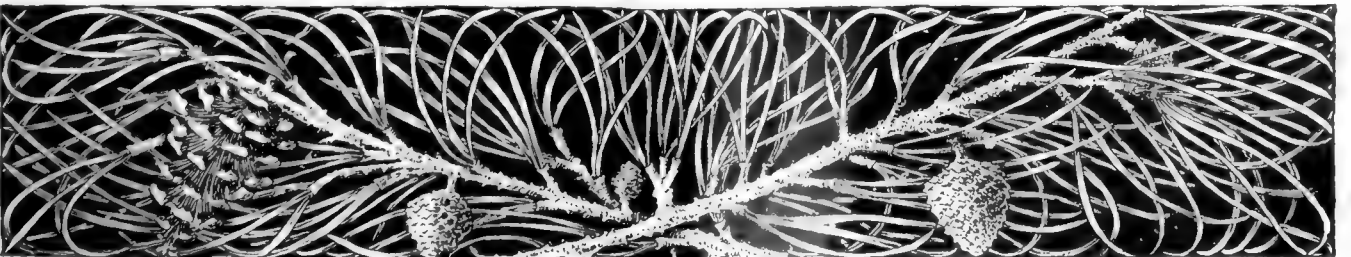
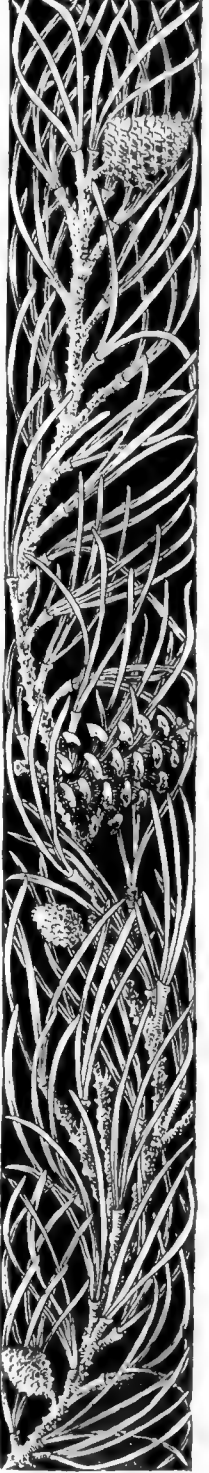
Then there was a larger creek where we went in above a big dam, in great fear of being swirled down the mill-race.

Darting dragon-flies, or "devil's darning needles," gave another risk, "cause they sew your shoulder-blades together—sure indeed they do! Oncet they was a feller 'at had his'n sewed together that-away, an' he never did get right. 'Course the doctor unsewed him, but he was always kind o' stiff-necked and humped-up-like, afterwards."

No one really believed this, but it was part of our game of make-believe, and added zest to life.

And these fancies prevail to-day. Who started the sign of two up-held fingers to mean "goin' swimmin'?" I'll bet that Pharaoh used it on the banks of the Nile!

Sometimes, when we see again the swimming holes of youth they seem to be shrunken away, because that's a way with youthful joys. But very often, we find that, because the trees have been cut down, the streams are smaller, and the pool that cost many a struggle when we were first swimming it, can now be straddled with one step.



Southern Floods and Their Forestry Lessons

BY HERMAN H. CHAPMAN

Professor of Forestry, Yale University

ON SATURDAY night, July 15th, after a day of rain, a continuous downpour set in covering the mountainous region of Western North Carolina. By morning from 10 to 15 inches of water had fallen, as measured by the records of the Weather Bureau. Upon the Catawba river, whose sources lie in the Blue Ridge east of Mt. Mitchell, a flood started which swept with increasing velocity and destructiveness through the entire length of the river to the sea, carrying with it, with one or two exceptions, every railroad and turnpike bridge on the stream, no matter how substantially built or anchored. Similar floods occurred on other rivers flowing both east and west from these mountain chains.

Accompanying these floods, great landslides, or mud avalanches, occurred on the steep mountain slopes, tearing gashes thousands of feet long and from 50 to 300 feet wide in the forest cover, and precipitating the débris on roads, railroads and into streams, where it was whirled away in the mad torrent to be deposited on fertile fields of corn in drifts two to eight feet deep. Swelled beyond all previous experience, these raging floods viciously gnawed into their banks. Protecting belts of trees were uprooted and whole fields, 30 to 100 acres in extent, melted into the current and were borne away, leaving a waste of boulders in place of soil worth \$200 an acre. The extent and suddenness of the damage were almost incredible, and unless one had seen conditions as they were before this flood, he would not believe that the transformation and ruin were the result of about twelve hours of high water. The death-list of over eighty persons was kept down only by the fact that most mountaineers build their homes on

high ground, and have had some experience with floods. Many had narrow escapes. Rising waters warned most families early in the evening. At the head of Clear Creek, from which the town of Marion, in McDowell County, gets its water supply, the family of James Turner, a mountain patriarch, took refuge at midnight in a small outbuilding to escape the encroaching flood, which was whirling down trees and logs on its crest. At the instant when

they had gained this shelter an enormous landslide started on the mountain directly opposite, tore its way down, completely filling and crossing a small ravine, causing the earth to tremble and plunged into the stream, sending a great wave up the bank, which, had it been a few seconds sooner, would have engulfed the refugees. Violent air currents were caused by this slide which threw the children about, but



VIEWS OF LANDSLIDES

The photograph on the right shows where the big landslide has washed across the course of a stream, completely blocking it. The second shows at close hand a part, and only a small part, of the devastation in the path of a landslide.

no one was injured. They then fled up the slope and passed the night in the woods without shelter, listening to the boulders grinding together in the flood as it swept away every vestige of their cornfield in the bottom. Mr. Turner, 76 years old and suffering from a malignant cancer, had been bedridden for months previous to this experience, but the shock and excitement restored his strength, and he was up and about, able to talk of the events of the night with gusto.

George Bird, forest ranger, whose house was on the flat, 100 feet from the old brook channel, became aware early in the evening that the stream was destroying his front yard and eating its way towards the house. He frantically emptied the structure of its furniture and children, and awaited the moment when it would disappear down stream. But the flood spent itself just



FLOODED CORNFIELD ON CATAWBA BOTTOM

The flood swept over this as it did over hundreds of other productive cornfields, destroying them by burying them in sand. The corn was in tassel and there is no possibility of a second crop.

before the stone chimney was undermined, and left the house overhanging the bank, whence it could be rescued and relocated on higher ground.

Bob Willett, farther down the stream, found in the morning that a new boulder-strewn channel, 150 feet wide, separated his house from his barn, which still stood intact on an island newly formed by the destruction of his best bottom land.

On the Catawba river, the farm of George Carson was almost completely carried away. This was in part due to the cutting of a thick grove of timber on an island lying directly above



C. C. AND O. R. R. BRIDGE DEMOLISHED

This bridge, south of Sevier, and thirty-five feet high, was swept away by a flood which was twenty-five feet higher than the water level shown in the photograph.



A WAGON BRIDGE, CATAWBA RIVER

Both the approaches to this bridge were destroyed by the flood, but the span was probably saved by the white oak which fell against it from the lower side, bracing it against the flood.

the farm owing to the desire of renters to bring more land under cultivation. Lacking this dense protecting belt, the current first gutted and destroyed the entire island and then swept right on across the old stream channel and took the Carson farm with it. At least 50 acres of bottom land were ruined. Carson's horses and cattle were abandoned to their fates, tied in the barn, but waters, which rose to a height of five feet, receded, and they escaped drowning. Two small colts even managed to survive by climbing into the mangers. Near the C. C. and O. Railroad bridge, a tenant farmer, with his wife and two small boys,

was seen gazing ruefully at the once fertile land, now a mass of boulders and mud. He said: "This don't look much like bread!" One refugee reached Marion bearing on his shoulders a sycamore limb. He explained that he had sat on that limb from Saturday evening until Sunday afternoon to escape being drowned—so he sawed it off as a memento.

A trip to the top of Mt. Mackey showed that the floods had their origin on the steep slopes of the higher ridges. The greatest damage was done by the crests which swept away the bridges, and by the enormous

amount of silt and wreckage carried by the stream, scouring and burying the bottoms. The steeper the slopes, the greater the per cent of rainfall which will normally run off instead of being absorbed by the soil. Thin soil, rock and bare or grassy ground adds to this tendency. The heads of the streams lie in deep pockets, where walls or slopes extend in a half circle about them and form a funnel, concentrating the run-off suddenly in the stream. On the extreme upper slopes, no flood effects were seen, but with this concentration, the lower slopes soon began to show the effects. In many places sheets of water had flowed down over the hillsides, carrying the leaves, dead trees and other natural obstacles into the streambed. Suddenly checked and swollen, the stream proceeded to burst these dams, and, piling up great mounds of detritus against every obstacle, it cut its way through with irresistible force. Meeting other flood crests emerging from contiguous valleys, the flood tore on to swell the main current of the Catawba, and complete the work of ruin. The effect was like the bursting of a dam, and in places small dams did go out, increasing the maximum height of the flood.

What is to prevent such calamities? When rainfall occurs of such tremendous magnitude in so short a time, floods are going to follow, and may again, as in this instance, overleap all obstructions. But in spite of this fact, the enormous retarding effect of the forest cover on the velocity of the run-off, especially on steep slopes, was strikingly evident. The possible effect, had these slopes been bare of trees, staggers the imagination. Unfortunately, forest fires have, until very recently, devastated the dried upper slopes to great extent, and have been prevented from completing the destruction



WHERE GOOD FARMING LAND WAS WASHED AWAY



FARM FLOODED AND FIELDS COVERED WITH MUD



VIEWS OF DESOLATION ON CARSON FARM, CATAWBA RIVER

The destruction here was direct due to cutting timber on an island up-stream, just above the farm. The flood tore out this island and carried the timber down stream at steep angles, tearing out a protecting belt of river birches. Entire fields were swept away to bed-rock, the force of water removing soil to the depth of from three to ten feet. It is claimed the river birches, when up to the top of the bank, actually aid in destroying the bank, while a reed bank is not apt to wash.

of the lower slopes only by their greater moisture and shade. These burned areas, devoid of vegetable humus, of decaying logs and other natural obstructions, presented practically no obstacle to the immediate precipitation of the foot or more of water falling upon them, in an overwhelming deluge upon the better protected slopes beneath, ruining these natural defenses of leaf litter, logs and brush, overwhelming them as, in an irresistible charge, the trenches of an enemy are demolished.

Had fire protection, extending through a period of two or three decades, restored the spongy soil cover to these high slopes, which is so characteristic of northern spruce forests, the furious rush of water into the streams would have been retarded and the flow distributed. Even if eventually just as much water

had escaped from the soil into the streams, the high flood crests would have been reduced, less sediment carried, less land washed away and the damage greatly reduced. None can prove that the forest cover on these mountains has any permanent effect either upon the amount or distribution of rainfall, but he would be blind indeed who could study the conditions on the ground and fail to realize that the forest cover, protected from fire, is the only means of saving the river valleys from utter destruction. That this destruction occurred was in spite of the forest and because of its neglected condition. The entire episode



IRON GIRDERS CARRIED AWAY BY FLOOD

The force of the rushing waters was so great that these heavy iron girders were washed two hundred and fifty feet down the bank of the north branch of the Catawba River from a bridge which was overthrown.

forms a striking argument for the rapid completion of the purchase by the National Government of as much land as possible in these high mountains and the establishment of rigid fire protection thereon.

THE NEW LOUISIANA FORESTRY LAW

THE full text of this forestry amendment to the Conservation Law of Louisiana was received too late for publication in our last issue. It reads as follows:

"Sec. 8. That one-fifth of all licenses herein collected from the severance of timber and turpentine shall be accredited to the forestry department of the Department of Conservation and shall be expended upon the warrant of the Commissioner of Conservation in the execution of the forestry laws and for such purposes only; provided that such forestry department under the general direction of the Commissioner of Conservation shall be superintended by a technically trained forester of not less than two years' experience in professional forestry work; provided, further, that no expenditure proposed hereinunder in executing said forestry laws by said Commissioner of Conservation shall be made except on the approval of a general forestry Advisory Board which is hereby created and which shall consist of four members to be appointed by the governor, and of the Commissioner of Conservation, who shall be ex-officio member and chairman.

Said membership shall be chosen, two from well-known timber owners, one from farmland owners interested in farmland reforestation, and the Professor of Forestry in the State University. The said Forestry Advisory Board shall meet quarterly at the domicile of the Conservation Commission, and not oftener except upon the call of the chairman, and shall have no salary compensation or per diem, but shall have actual traveling expenses for attendance upon such meetings."

It is estimated that the revenue from the license tax on timber and turpentine alone, under the new law, should approximate \$100,000 annually, which would make available about \$20,000 for the work of the state forester.

AMERICAN FORESTRY called attention to the need for this amendment of the Louisiana Law and reorganization of the work, in an editorial published in May of this year. The immediate response of public sentiment and securing of the law is a striking proof of the fact that Louisiana was in reality well abreast of the times in general knowledge of and interest in forestry, and ready to take this great forward step, which means so much to the entire movement in the South.

**HAVE YOU NOMINATED ONE OF YOUR FRIENDS FOR MEMBERSHIP?
WHY NOT DO IT—NOW WHILE THIS REMINDS YOU?**

An Example in Conservation Work

THE Berks County Conservation Association of Pennsylvania is one of the most striking examples in the United States of what may be done for conservation by the right kind of local organization. Organized in September, 1914, it found facing it the problem of conserving the forests and trees of the county, the water-sheds and water courses, bird life and places of scenic value. Blessed with energetic officers, it speedily extended its membership, aroused the interest of all the people of the county in its work; enlisted the aid of the school teachers and the school children in its tree-planting

"In the fall of 1914, we planted 3000 pines on Mount Penn; maintained a Forest Fire Patrol of 14 men and 6 State Policemen during the dangerous forest fire season. Large placards, cautioning the people of the dangers and losses from forest fires, were posted all over the county, and an educational campaign, through the newspapers and in the public schools, was inaugurated. Forest Fire Wardens were appointed by the State Forestry Department at our request and are still in service. The Association tabulated the forest lands of Berks County, and we know now where every acre is and who the owner



operations; secured the assistance of the newspapers in giving the publicity required; obtained the cooperation of other organizations, and has now achieved a very considerable success, as well as established the conservation movement in the county so strongly that it will not die. At the same time the Association, by its endeavors and by the particularly good results obtained, has set an example to other organizations and has encouraged the growth of a number of them along similar lines of work.

What it has accomplished is well described by Harvey F. Heinly, an attorney of Reading, Penna., and an enthusiastic member of the Association. He says:

THE REGIMENT OF PLANTERS EN ROUTE

Fifteen street cars were required to transport the Boy Scouts and school girls of Reading, Pennsylvania, who enlisted at the call of the Berks County Conservation Association, to plant several thousand trees on the water-shed of the company which supplies the city with water.

of it is; and in order to encourage proper reforestation the Association went so far as to find customers for those who have made up their minds to market their timber in a proper and scientific way.

"During the year 1915, 2000 small pines were planted at the Bethany Orphans' Asylum by the children themselves; 1000 small pines were planted at the Topton



THE REGIMENT OF TREE PLANTERS

A large force of school children, gathered by Reading to plant trees, assembled for action on the land

HOW TO PLANT

A squad of the Reading tree-planting force being instructed by a forester how to place the trees in the ground.

A PLANTING SQUAD AT WORK

After instruction by the forester, these girls went to work and not only planted a quantity of trees but did the work skilfully.

Orphans' Asylum, at Topton, by the orphans. At the suggestion of the Association, a municipal nursery was started at Lake Antietam, where there now are 30,000

property, its water-sheds and its mountain property, by 220 boys and 770 girls of the high schools; 25,000 were planted at the State Insane Asylum, South Mountain, by the inmates of that institution; 10,000 more were planted by the orphans at Bethany Orphans' Asylum at Womelsdorf; 10,000 by the orphans at the Topton Orphans' Asylum, at Topton; 21,000 were planted by James A. Schofer, at his place on State Hill; 20,000 more were planted by the Borough of Fleetwood by the school children; 5,000 were planted by County Controller Rhode; 6,000 by W. E. Sharman, a lawyer near Fritztown; 6,000 by Sherman H. Hoverter, another lawyer, in Alsace Township; 26,000 by another lawyer, Herbert R. Green, on the slope of Neversink Mountain; 45,000 by Jacob Nolde on his property in Cumru Township; and 17,000 were planted on the Horst tract.

"At the instance of the Association, the Reading School District employed an expert to trim all the trees on the Reading School District grounds, and hundreds of people were instructed how to plant trees and how to preserve them. Representatives of the Association spoke on the subject of tree planting and conservation before granges, schools and conven-



THE PLANTING SQUAD

After the boys had dug the holes for the seedlings, the planting squads of girls followed and planted the pine seedlings quickly and well. The character of the work is excellently shown by the photograph.

seedling trees furnished by the State; 8,000 pines were planted on the Antietam Water-shed by 430 school girls; 7,000 pines and spruces were planted on Mount Penn by 125 high school boys; 3,000 pines were planted on the water-shed of the municipal water-works at Fleetwood; thousands of pines were planted by individuals.

"Travel trails were laid out to all points of interest in Berks County, to be marked by flying birds and a book called a Blue Book. At the instance of the Association, a Volunteer Forest Fire Patrol was organized among the school boys, boys' clubs and Boy Scouts, for the purpose of educating them in fire prevention and forest fire fighting. A press campaign was organized for fire prevention through the public and the schools of the county; and the Association had educational exhibits at the Reading Fair, Pure Food Exhibit and Electrical Show on the subject of conservation and fire prevention.

"During the year 1916, up to the present time, we started a permanent office and elected as secretary, Mr. Solan L. Parkes. We started a campaign in the beginning of the year for further forest planting, and requests for one-half a million trees were received from every township in the county. The State Forestry Department furnished these. A million trees were planted in April and May of this year; 10,000 were planted on Reading City



PREPARING FOR THE PLANTING

Before the regiment of tree planters arrived, squads of men cleared the ground, burned the brush, dug holes and put the water-shed in condition for the invasion of the conservationists.

tions, and every kind of meeting, and wherever possible information was given to hundreds as to the beautification of school grounds and public buildings. A move was started to have a shade tree commission for the City of Reading; 150 bird houses were furnished by the Reading School District through Samuel J. Waid to the country schools as samples and these grew into 1,500 bird houses in the county; an educational



PLANTING THOUSANDS OF TREES

With several hundred school girls and boys at work, the Berks County, Pennsylvania, Conservation Association was enabled to plant several thousand pine seedlings in one day.

campaign was started and various societies gave prizes for essays on conservation and bird life and wild flowers; and the beautification of the roadside has been started, and an effort is made to form an organization for the purpose of preventing the further desecration of our mountain sides and to finally acquire the mountain sides surrounding the City of Reading."

The officers of the Association are Jonathan Mould, president, Solan L. Parkes, executive secretary, and Daniel K. Hoch, treasurer.

WHITE MOUNTAINS FORESTRY CONFERENCE

NATIONAL Parks, National Forests, and State Forests will be the chief topics for discussion at the annual New England Forestry Conference at the Crawford House, Crawford Notch, N. H., September 5 to 7, 1916. Held in the midst of the new National Forest, which serves also as a National Park, and adjoining the State Purchase of 6000 acres in the Crawford Notch, these subjects of administration will be particularly appropriate.

Mr. Henry S. Graves, Chief U. S. Forester, and Mr. Wm. L. Hall, Associate Forester, in charge of the White Mountain and Southern Appalachian purchases, will be present; also Dr. B. E. Fernow, President of the Society of American Foresters, and Professor Filibert Roth, Director of the Forest School, University of Michigan. It is hoped that Mr. Stephen T. Mather, Director of the National Parks, will make an address.

There will be excursions into the National Forest, on the Presidential Range, and through the splendid forest of primeval spruces on the New Hampshire State reserve.

A cordial invitation is extended to all members of the American Forestry Association.

A TROUT PROBLEM

THOROUGH tests of devices to prevent fish from entering irrigation ditches are to be made by Forest Service officers, who say that thousands of the trout placed in western streams by the Government are killed through being carried into the ditches and washed out on the fields. There are not less than 1200 irrigation projects on or near the National Forests, and in many places the loss of trout is very heavy. The amount of water used in irrigation, it is said, often determines the advisability of artificially stocking the streams.

The Government annually plants large quantities of fish fry in the streams of the National Forests. Last year over 1,100,000 were planted in Colorado and Wyoming alone. This was done to render the Forests more attractive to the public by affording good fishing.

WASHINGTON'S TREES CRITICIZED

BY FRANK A. CUTTING

A SHORT time ago I was in Washington and was particularly disappointed as regards the trees in our National Capital. There had not been much care taken in setting out the young trees. Many of them did not have a good leader and the branches are low and they never can be brought into a condition to make good trees. Many trees have not received the pruning and attention that they should have received.

Shade trees in a city should be selected carefully and of varieties that are long lived and grow to a good size. Some of the old towns in New England have beautiful trees. They are 30 to 40 feet up to the first branches and one can get a beautiful view underneath the branches in all directions. In these best shaded cities and towns we are now enjoying the thorough work that some one did for us a hundred years ago. We should be as careful to provide shade for those who are to come after us. No new street should be accepted if it does not have shade trees. All the streets in Washington that have no shade trees should be studied carefully and the trees that are best adapted for each particular street should be planted at once so that they would soon add to the beauty of the city and comfort of the people.

In country towns and villages, the selectmen should refuse to accept any streets from land promoters until a first-class line of trees has been established on both sides of the street.

Shade trees on the streets and around our homes are of great importance to all the people of the United States, and with a little effort on the part of the people we can have a great improvement in the near future.

Boys, Guns, Birds and Trees

THE relation between forestry and the lad whose father arms him with a toy rifle may not be apparent at first glance. There is, however, a pretty close relationship in some localities and under certain circumstances. Concrete instances point the moral of a tale better than can be done by general statements, says the *Hardwood Record* of Chicago. Everybody with any degree of information concerning the balancing forces

ants of the woods has increased or decreased, depending on the season, for a long time; but it has never stopped.

Some birds present a much more inviting target than others to the boy with a rifle. None attracts more than the woodpecker. Even the children of the wild Indians killed woodpeckers as their first adventure with the bow and arrow. Though some species are wild and shy, they are not difficult to approach if the hunter is skilful.

THE TREES' BEST FRIENDS

Trees have no better friends than the woodpeckers. Every forested region has one or more species. The ivory-billed woodpecker holds chief place in southern forests, the hairy woodpecker in the far north, the black



SOFT MAPLE KILLED BY ANTS

The birds which ordinarily would have eaten the ants which killed this tree were driven away by boys. The building in the background is the Central School of Evanston, Illinois. What an object-lesson for teaching children to protect birds this unsightly stump presents!

of Nature knows that but for birds, the insects would devour all the vegetation from the face of the world. For some years past the small boys of the North Shore (some parts, but perhaps not all parts) have been abundantly armed in spring, summer, and fall with toy rifles and have gone forth to shoot without much restraint from parental or municipal authority. These guns are not all harmless toys. Many shoot cartridges and can properly be classed as deadly weapons, while others are air guns and are less harmful, but are none the less nuisances. Boys no more than seven years old have been furnished with such guns and have gone out with boys of larger size to shoot birds. The war against the feathered inhabit-



FOR LACK OF BIRD PROTECTION

Boys with rifles and sling-shots keep all the birds away from this section of Evanston, Illinois, and as a result this yellow oak has fallen a victim to ants and other insects and associated fungus which the birds would have destroyed.

ant-eating woodpecker on the Pacific coast; while the central hardwood region is the favorite home of the downy woodpecker (*Picus pubescens*). It is black and white, sometimes with a red feather or two, and in size is rather smaller than a robin. Some call it a sap-sucker. It may occasionally indulge in a sip of sap from small holes which its bill punches in a tree's bark, but its sub-

stantial food consists of insects which it picks from holes in decaying wood. It devours ants by the thousand.

This small, beautiful, harmless bird is the creature against which the boys of the North Shore woods have waged ceaseless and senseless war until it has been exterminated (or apparently so) in many wooded tracts. These are the districts where ants and other insects are now destroying the trees. It is naturally a tame bird. If well treated it will fly about door yards and clean the insects from the shade trees; but it no longer does that in some of the towns along the lake shore north of Chicago. You may now walk through the five miles of beautiful natural woods which have made Evanston famous and the chance is that you will not see a woodpecker, though you will not fail to see numerous trees patched with cement to hide holes eaten by insects and fungus. The rifle in the hands of the uncontrolled small boy has done its work. The surviving woodpeckers know better than to venture across the firing line. For them it is written: "Abandon hope, all ye who enter here." A few miles west, beyond easy hiking distance of the youthful gun-carriers, woodpeckers are abundant on the trees and fences, bearing witness to the fact that they have not fled the country entirely, but have fled to zones of safety.

Local instances of bird destruction and consequent forest deterioration lose much of their general importance if they are found to be only isolated cases. Doubtless many instances like those about the North Shore villages would be revealed by a search throughout the country. In some places game wardens protect birds, and thereby protect forests; and the boy with his rifle does not have as smooth sailing as he has in some of the high-class residential sections northward from Chicago. Every forester knows, and most people in any way connected with woods or the lumber business know, the incalculable service which birds render the forests by destroying insects. All intelligent farmers know how their crops are benefited by the feathered inhabitants of the fields and thicket. Yet, it appears that there is yet room for some primary missionary work along this line.

The two accompanying illustrations show results. The broken snag was once a soft maple tree which stood a few rods from the Central School, Evanston. It fell into poor health and ants attacked it. It soon yielded to the attack. The insects so weakened the trunk that it broke in a wind-storm. The ants had penetrated to the centre and left no sound wood, for decay kept pace with the burrowing ants.

The other picture shows a yellow oak near Asbury Avenue, South Evanston. No woodpecker dares venture there, and ants and other insects, and the associated fungus, are doing their deadly work. The tree is now too far gone to be saved. It is still alive, but will succumb in a year or two. Birds might have saved it, but for the boys and their rifles.

These trees are samples only. Hundreds of others could be found, showing the destruction by insects, aided and abetted by the small boys and their rifles which have driven the birds away.

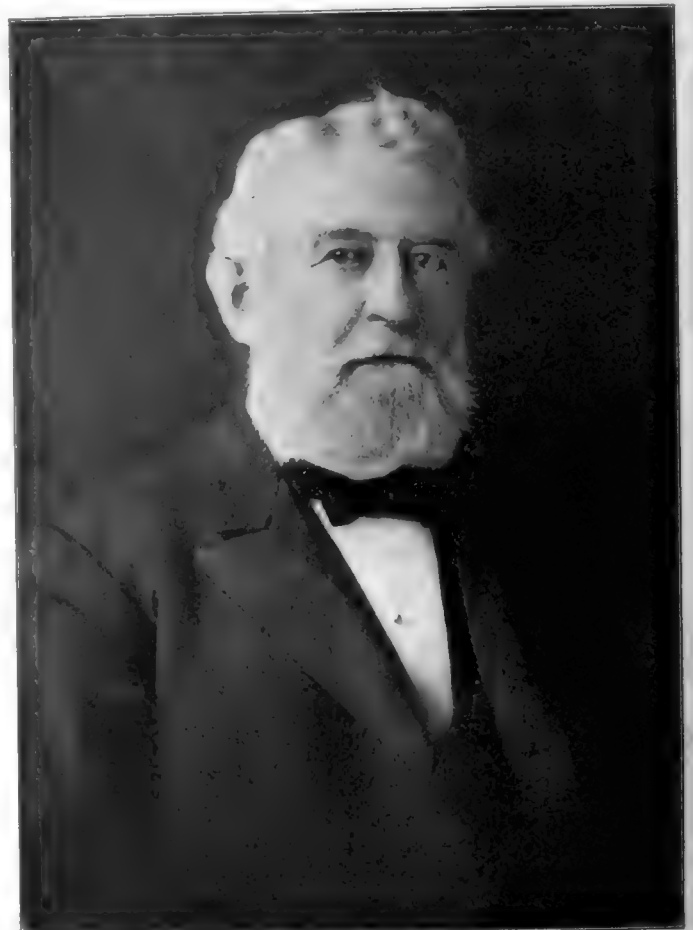
FOREST CONSERVATION

By JOSHUA L. BAILY

Vice-President, American Forestry Association

ARE not the forests themselves better authority on conservation than anything I would be able to suggest? I have been much interested lately in some thoughts concerning the longevity of trees, and their reliability as time-keepers.

Not long ago there died in one of the public institutions in Philadelphia a woman who was said to have lived



JOSHUA L. BAILY, OF PHILADELPHIA
Vice-President of the American Forestry Association.

one hundred and twenty-eight years, but there was no mark upon her person by which her age could be ascertained, nor any record to establish the claim to longevity. Tablets are found in the ruins of ancient cities bearing inscriptions of much historical interest, but they are too often lacking in accuracy.

But the records kept by trees are devoid of all uncertainty; each tree keeps for itself what might appropriately be called "a year book," in which is noted every year as it passes. There are no omissions and no mistakes. Whether the tree has lived a hundred years or a thousand years or four thousand years, the record is intelligible, definite and infallible.

Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

EDITED BY J. J. LEVISON, B.A., M.F.

TAKING CARE OF SHADE TREES

IN THE foregoing two papers we have seen the advisability of any city or even local block community undertaking the planting and care of its shade trees. We have also considered ways and means of attaining the necessary organization and decided upon the advisability of having all work coördinated under the head of one bureau, commission or single head.

With the work coördinated, place the responsibility of all tree matters on a professional forester, a man trained in the science of forestry and arboriculture and one of considerable experience in park work. His duties will be to see to all planting, spraying, pruning and cultivating. He will establish a municipal nursery, test the various insecticides and fungicides, install the best apparatus and enforce the city tree ordinances. He will organize the office work, plot the street trees on a map and advise citizens on their tree problems. He will issue permits for tree removals and private tree pruning, study the local tree problems, collect tree statistics and promote public interest through lectures and writing.

The enactment of a good city tree ordinance is the next step. A number of cities now have such ordinances in force and the new one may be modeled from those. The tools to work with are thus provided, and if the trained expert is a good one, the details of carrying out the work may be left to him. The city tree commission, or whatever board has charge, should oversee his work occasionally, give him the benefit of its official support, and back him when necessary, because in the beginning of all such work there frequently appear many cases of opposition from citizens, who, either for selfish motives or otherwise, try to force their own views in the matter of handling technical tree problems.

The attention of the forester will probably be directed first to the care of the existing trees rather than to the addition of new ones.

Spraying for leaf-eating insects may be his first work. Street trees, growing under less favorable conditions than park trees, are naturally weaker and more susceptible to insect attack. Street elms without care very seldom escape attack from the elm-leaf beetle and such trees as the horse-chestnut and linden are titbits for leaf-eating caterpillars. Let all such spraying be done early while the insect is young and susceptible to the poison. It is also important to look into the chemical and physical value of the insecticide you are using.

A few years ago, I found one of the best known brands of arsenate of lead to contain as little as 4 per cent of arsenate oxide, whereas it should have had 15 per cent or more to be the least effective. Since then, we have been subjecting our spraying material to chemical and physical tests and have been paying considerably less than what we had been paying before.

Success in spraying will, moreover, depend not only on the value of the insecticides and upon how early in its feeding stage the insect is attacked, but also on the thoroughness with which the work is done. The kind of apparatus used will also make an appreciable difference, for a barrel pump is too slow for the amount of labor used to operate it and a very heavy wooden tank, such as is commonly used for woodland spraying, would prove too sluggish and cumbersome in going about the city streets.

In late summer and early fall, *pruning* will be in season. The men should then be trained in the fundamental principles of the work and furnished with printed hints on the necessary precautions in climbing trees and removing branches. We have had little booklets published on such topics for our men and find them very helpful.

Close cuts and application of coal-tar to the wounds should always be insisted upon and, above everything else, do not



TREES BADLY PRUNED

Nothing is more unsightly than a row of butchered trees such as here shown. Unfortunately such a sight is all too common, and may be seen in more communities than one cares to count.

let them prune more than is necessary. The tendency on street trees has generally been the other way, to the great detriment of the trees.

TREATMENT OF CAVITIES

Cavities caused by some old neglected horse-bitten wound, or by an improperly made cut, are more common



RESULT OF NEGLECT

This tree should have been protected with a wire netting guard, but nothing was done for it and the result of this carelessness is evident by a glance at the picture.

in street trees than in park trees, and the present tendency is to indiscriminately fill them all with cement. This work is expensive and in many cases unjustified. It is particularly true of trees on the streets because there the trees are frequently of poor species and the cavities so neglected that the absolute elimination of diseased wood is utterly impossible. There the decay would keep on developing after treatment with the same rapidity as before treatment. Cavity filling is justifiable only where the tree is a much valued specimen, where the filling can serve the practical purpose of eliminating moisture and where every trace of diseased wood can be thoroughly removed before the filling is inserted. In many cases the proper use of the chisel or gouge alone without the filling will eliminate all disease and leave the wound in a position where moisture will not collect. The absolute eradication of all infested wood from a neglected cavity is often impossible and in many cases where this is true, the ax is by far the safest and most practicable tool. Street trees especially should be cut down as soon as they become the least dangerous, or when their trunks become hollow or badly infested with disease. For, as soon as the citizen notifies the



A DANGEROUS PEST

Removing egg masses of the Tussock moth from shade trees.

authorities of the condition of his tree, all responsibility is shifted on the city and law-suits are sure to follow in case of any subsequent damage.

The next consideration to engage the forester's attention will be the planting of trees and that we shall leave for the next issue of the magazine.

BROOKLYN'S TREE PLANTING

Park Commissioner R. V. Ingersoll, of Brooklyn, has undertaken to dot Brooklyn with trees, and will plant 600 at one time along a three-mile stretch of Bedford Avenue.

The trees which Commissioner Ingersoll plans to set out are the Norway maple and the Oriental sycamore. "Both these varieties," he said, "grow rapidly and give ample shade, and prove very hardy in city conditions."

In undertaking to interest property owners in this campaign for street-tree planting Commissioner Ingersoll has developed a force of men to take special care in planting trees. These men see that these trees are properly pruned and otherwise cared for.

"A pail of water every day will do wonders," the Commissioner said. "Another thing to do is to cultivate and work up the soil around the roots. If people knew the splendid results they would obtain by doing just that little bit of work, more of them would be anxious to do it. It is especially necessary to break up the earth around the roots of trees when they are not surrounded by grass plots. Where the grass is absent the soil is apt to be trampled so hard that no moisture can penetrate it."

INQUIRY DEPARTMENT

Send any inquiries about tree conditions to The Editor, AMERICAN FORESTRY, Washington, District of Columbia, and they will be answered without charge.

ADVICE FOR AUGUST

1. Commence pruning shade and ornamental trees this month.
2. Transplant evergreens after the 15th of August.
3. Collect and burn egg masses of the Tussock moth and similar insects.
4. Collect and burn cocoons of the bog worm and similar insects.

QUESTIONS AND ANSWERS

Q. Please give me the proper soil elements necessary for vigorous growth of maple, elm, oriental plane, catalpa, poplar, locust, beech and birch, also fruit trees. Present soil is clay and gravel. Are wood-ashes and bone-dust and lime advisable?

W. M. C., *Oakmont, Pa.*

A. Replying to your inquiry, the trees you mention will grow in any ordinary good farm soil. The elm, beech and fruit trees are more fastidious in their soil requirements, and need more moisture than others mentioned. The plane will adapt itself to the ordinary poor soil of the city street and the catalpa and locust will grow in the dry, poor soil. The poplar is the least particular of all and will grow where little else will grow. The addition of bone-dust and wood-ashes is very good, but the lime is more of a local question, depending on sourness, etc., of soil, though a little of it is likely to do good. The best fertilizer that we would recommend for your soil would be well rotted manure dug in thickly.

Q. Is it advisable to remove the extra growth developing in bunches of twigs and leaves on the main branches of elms or oaks? Shall appreciate your advice.

E. L. S., *Cincinnati, Ohio.*

A. The extra growth on the elms and oaks should not be cut off. The vast amount of rain this season in the East has produced a profusion of growth which does the trees good and makes them more attractive. To keep the crown thick with foliage is a good policy for the upkeep of shade trees.

Q. There is a growth or gall similar to the one enclosed on my hickory trees, and I write to see if you can assist me with a cure for the same. The growth is rather round, comes on the young shoots, and in time comes on every shoot so that it stops all growth and the trees die. Some of the largest hickory trees around here are giving up the fight. I enclose a leaf of hickory which ought to be helped by the right spray. The growth is same color as shoot and opens up as specimen of its own accord.

N. W. C., *Eden, N. Y.*

A. Replying to your inquiry, I beg to say that your hickory is affected with what is known as the hickory gall aphid, a species somewhat common and one which occasionally seriously disfigures hickory trees and at such times causes considerable injury. The remedy consists in spraying with lime-sulphur wash in the early spring, and cutting and burning the galls in early summer before the plant-lice have deserted them. The latter method, however, is sometimes very difficult to carry out on account of the large size of the trees. These methods would apply to lawn and shade trees but would not be practical for checking the insect in forest trees.

Q. Please prescribe proper treatment for elm too large to spray conveniently; leaves badly eaten and shrivelled up. Is nicotine spray advisable for maple gall?

W. M. B. C., *Oakmont, Pa.*

A. Relative to your large elm, the eating of the leaves is very likely due to the elm-leaf beetle. Spraying with arsenate of lead in early June is best for it. The grubs of the beetle, however, have a habit of crawling down the trunk to the base of the tree in early August to pupate, and while the insect is in that pupa stage you can collect them at the base of the tree and destroy them. The curling of the leaves is probably due to plant-lice which

appear on the under side of the leaves. Spraying with whale-oil soap, one pound to ten gallons of water, is the best method of fighting this insect. Nicotine spray for maple gall, if the tree is large, is too expensive and therefore never used. Use lime-sulphur wash in early spring in place of the nicotine.

Q. I want information in regard to the proper treatment of soil in seed beds to eliminate the growth of weeds.

Can the soil be inoculated with a formula that will destroy weed seeds and not injure the tree seeds? Is there any spraying mixture that could be used after weeds had started to grow that would kill the weeds and not injure the little seedlings?

Any information you can give me on this subject will be appreciated.

D. H., *Dundee, Ill.*

A. Replying to your inquiry I will answer the questions in the order in which they are put.

1. There is nothing that can be put into the seed bed that will keep out weeds, and will not at the same time prevent other vegetation from growing.

The growth of the weeds can be prevented, however, by the following methods:

(a) The bed may be started a year previous and allowed to remain without any seeding for the whole summer, and during that summer it should be cultivated frequently in order to kill off all weeds. This is often done, and it is known as "summer cultivation" as a preparation for future planting.

(b) Another method may consist of something which is often used by rose growers; namely, to sterilize the soil by the method of steaming. I have heard of cases where this steaming process is applied to outside beds, as well as to heaps of soil within green-houses. A modification of this method may consist of burning the vegetation in heaps along the bed all through the summer, and in that way producing a weedless bed for the following year.

2. There are a number of mixtures that can be used to destroy weeds, but would not be applicable to beds where seedlings are growing, because they would destroy every other form of vegetation at the same time.

Q. The tops of my beech and birch trees are dying off in large numbers. Please tell me the cause of the trouble and what to do.

L. M. C., *Reading, Pa.*

A. Very likely your beeches are suffering from impoverished soil, insufficiency of moisture or late developing winter injury. We have had complaints from many parts of the East where the beeches were going back the same way. In most of these cases it was not an insect or disease that was responsible, but rather a climatic or soil stress of one kind or another, and where we had a chance to apply a remedy we found that special stimulation of manure, water, cutting back the crown and even artificial fertilizer have helped very much.

The birch trees are very likely affected by the bronze birch borer, an insect which has done a great deal of damage of late years to all species of birch trees. Removing the infested tops and burning them before the grubs have a chance to go too far down is the most practical remedy.

Q. What do you consider the best vine for covering banks?

R. P. R., *Hartford, Conn.*

A. If the spot has plenty of sun, use *Rosa wichuriana*. If it is more or less shaded, you might use Hall's honeysuckle.

A LOGGING ENGINEERING COURSE

THE appointment of John P. Van Orsdel to the position of Professor of Logging Engineering in the School of Forestry at the Oregon State College is an event of some importance in forestry education in the United States, and particularly in the Pacific Northwest. The significance lies in the fact that Van Orsdel is recognized by the big timber operators as one of the foremost logging engineers in the country. The appointment is important, too, in that it demonstrates to the practical



JOHN P. VAN ORSDEL

Who has taken the position of Professor of Logging Engineering in the School of Forestry at the Oregon State College.

timbermen that educational institutions have come to realize the nature of the woodsmen's problems and their responsibilities in aiding in their solution.

As a young man, he put in seven years cruising timber, locating and surveying logging railroads and flumes, and planning logging operations generally. During this period he had for his clients the Portland Lumber Company, J. D. Lacey & Company, Hammond Lumber Company, Inman-Poulsen Logging Company, Weed Lumber Company, and practically every other important timber concern in the West. The scope of his activities is indicated by a cruise and accurate resurvey of a 55,000-acre tract for J. D. Lacey & Company in California. In 1910 he established the first firm of logging engineers in the United

States. In 1911 he was appointed superintendent of woods operations for the Portland Lumber Company, a position which he still holds. This company is one of the largest operating timber concerns in the world. One of Van Orsdel's achievements with this company was the delivery of 153,000,000 feet of logs in one season.

Mr. Van Orsdel has always been interested in the technical phases of the timber business. He has been a constant contributor to the lumber trade journals and has prepared technical papers for practically every meeting of the Pacific Logging Congress. He devised a scheme for making topographic logging plans and is the originator of what is known as the Van Orsdel bonus system. He is interested in technical logging education. He has been instrumental in inducing several promising young loggers to go to college and has been a non-resident lecturer on scientific logging subjects at the Forest Schools in Washington and Oregon for several years.

In assuming his new line of work, Mr. Van Orsdel will still retain his connection with the Portland Lumber Company. This connection will permit him to take his students out on up-to-date logging operations for first-hand woods instruction. It will also enable him to place students of logging engineering, during vacations, on special lines of logging work in which he desires them to gain experience. The plan will bring the college within reach of every aspiring logger, since he will be able to earn enough to pay his way while he is getting his education.



THE WASHINGTON ARCH WITH WASHINGTON'S PROFILE

This unusual photograph of the Washington Arch in New York City with a striking outline profile of General George Washington was taken recently, when a combination of the tree in full leaf, a building the top of which shows above the tree, and the Arch, all combined to produce a profile of the Father of his Country who is unmistakable. Without the tree the likeness would be missing.

The First Record of a Sequoia

BY DONALD BRUCE

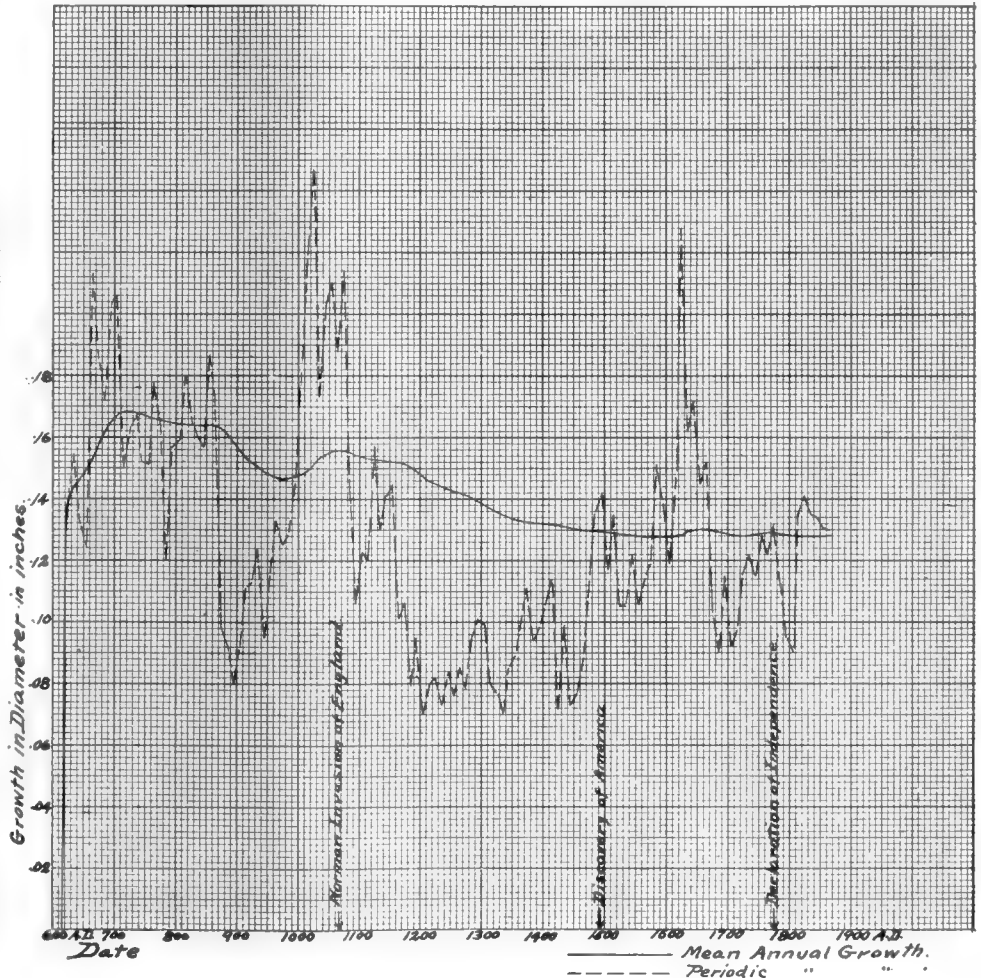
Assistant Professor of Forestry, University of California

WHAT is probably the oldest tree stem analysis on record for the western United States has recently come into the possession of the Forestry Division of the University of California. The measurements were taken on a big sequoia near Eldorado in Calaveras County in the Sierras in 1865. The tree measured 26 feet 6 inches in diameter on the stump, which was six feet above the ground, while its age at the stump point was 1245 years. The form of record is unusual, consisting of a long, narrow roll of paper, 9 inches wide by 14 feet long. On this a pencil centre line is drawn, along which the position of each annual ring is marked by an inked cross line, every tenth line being somewhat longer. The only figures appearing are the serial numbers of the decades entered for quick identification. The preparation of such a record must have involved an enormous amount of labor and its form is far from convenient, but except for the meagreness of the description of the tree it should serve every purpose of a modern stem analysis.

This document was among the records of the late Professor E. W. Hilgard, the eminent authority on soils, and the author of the classic text with which so many foresters are familiar. Shortly before his death he directed that it be given to the newly established Division of Forestry of the University which he had served so long and faithfully.

There is every reason to believe that this is a record of the dimensions of the first of the giant trees to be seen by a white man. The discovery of the species was made in 1852 by a hunter while in pursuit of a grizzly bear which fled into what is now known as the Calaveras Grove. In amazement at the size of this original big tree, the bear was forgotten and the hunter returned to camp to tell his companions of his find. Not unnaturally his story was heard with such complete incredulity that he could not persuade anyone to return with him to examine the tree. After a day's futile effort the discoverer

again sallied forth, ostensibly to hunt, and presently returned claiming that he had killed a huge bear and needed help to bring it into camp. This story found so much more ready acceptance that the whole party immediately volunteered to accompany him, and were thus led to the



GROWTH CHART OF ORIGINAL BIG TREE

On this chart are plotted two lines, the broken one showing the average rate of increase in diameter for each ten-year period, and the solid one indicating the average rate of increase during the tree's whole life to each given date.

giant tree. The rest of the Calaveras grove was soon found, proving that it was the species rather than the individual which was so remarkable.

Within a year or so the bark was stripped from this original tree and the tree itself, of course, died. It was therefore determined to fell it. Long saws were as yet unknown and axes seemed hopelessly inadequate, so the work was done by boring a series of holes with long pump-augers. Five men worked 22 days, only to find that even after the wood had been completely severed the massive weight of its stem defied all attempts to bring it to the ground. Two and a half more days were futilely

spent with wedges and block and tackle, until at last, just as the effort was being abandoned, a slight breeze sprang up, and with apparent ease toppled over the big tree. Its dimensions are reported as being 25 feet in diameter, measured on the six-foot stump, exclusive of bark, which was fifteen to eighteen inches in thickness, and 302 feet high. That locality, diameter and height of stump should agree with those of the stem analysis seems more than a coincidence, particularly since it is improbable that another tree of such size should have been felled before 1865, the date the measurements were taken.

The age of this tree is far below the figures generally quoted for specimens of the sequoia of that size. Even allowing for the considerable exaggerations which are current as to the longevity of the species, this individual was undoubtedly one of exceptionally rapid growth. The accompanying diagram illustrates this, being in interesting contrast to the typical growth curves with which the forester is familiar. On this chart are plotted two lines, one (broken) showing the average rate of increase in diameter for each ten-year period, and the other (solid) indicating the average rate of increase during the tree's whole life to each given date.

Several points will strike the forester as remarkable. First, the mean growth rises very rapidly to its crest by the end of the first century and yet falls off very gradually after that point so that 1100 years later its average was still within 25 per cent of its maximum. Moreover, its decrease within the last half century is almost imperceptible. Its current growth rate also shows remarkable fluctuations. That the next to the greatest growth during its whole life should have come when the tree was 1000 years old, and some 400 years after its smallest growth, is a striking index of its undaunted vitality. A careful study of the alternating periods of rapid and slow growth lends distinct weight to the impression that climatic cycles rather than the effect of age have dominated the tree's development.

ROADSIDE TREES NEEDED

BY INVESTIGATIONS just completed by the New York State College of Forestry at Syracuse, it has been found that nine-tenths of the roadsides in the rural districts of New York State are entirely void of shade trees. When this is considered along with the fact that last year New York State paid out of the State Treasury about \$30,000,000 for the construction and maintenance of roadbeds, it shows that the State is not yet awake to the great need and the great possibilities in rural roadside improvement.

The preliminary survey which has just been made by H. R. Francis in charge of the Landscape Extension work of the College of Forestry, covered nearly 3000 miles of the main lines of highways passing through such important points as Rochester, Buffalo, Jamestown, Olean, Corning, Ithaca, Elmira, Binghamton, Kingston, Albany, Lake Placid, Watertown, Utica, Rome and Syracuse.

During the survey studies were made of such impor-

tant features in rural roadside improvement and beautification as good and bad varieties of trees found along the highways, views and vistas obtained from the highways, the effects of the shade trees on crops in adjacent fields, the possibilities of the covering of barren embankments and the planting of some desirable sort of vegetation where overhead wires are in large numbers. One of the principal features studied was the condition of the roadbed as affected by the presence or absence of shade trees.

ITALY'S FORESTS SUFFER

A REPORT from Rome says ocean freights on American lumber have increased tenfold since the war began and the Italian Government is beginning to make inroads on its own precious reserve stocks of standing timber.

There are about 16,000 square miles of forest area in Italy, or one-seventh of the total area of the country. Most of the timber wood is found in the Apennine Mountains, which follow the entire length of Italy, beginning north of Genoa and rising out of the fertile plains of Piedmont.

The wood is being used by the Government in large quantities for the construction of soldier barracks at the front, for strengthening trenches, for railroad and foot or wagon bridges along the countless new roads built at the front as a part of the army's transportation system. Much of this lumber is carried piece by piece far above the timber line of the mountains where the soldiers are fighting on barren glaciers.

The kinds of wood being cut in Italy's forests are fir, oak and sycamore, woods formerly imported from Austria. Until recently many shiploads of pitch pine, mostly from the Gulf ports of the United States, were delivered into Italy. But the freight and handling cost has made the price prohibitive.

SELLING BIRCH BARK

AN application to buy all of the bark of black birch on a large water-shed in one of the National Forests in the Southern Appalachians has been received by officers in charge, who say that the bark will be used by the mountaineers to make sweet-birch oil, a substitute for oil of wintergreen. Because of the higher price of birch oil and oil of wintergreen, a synthetic oil is widely used in their stead. The rise in price of salicylic acid, which is the base of the synthetic oil, is reported to have increased the demand for the birch oil manufactured in this country. The oil is largely used for medicinal purposes and for flavoring, and a good demand is said to exist. So-called rheumatism cures in particular contain comparatively large amounts.

The forests in the East purchased by the Government are reported to contain large quantities of birch and are expected to become an important source of supply.

The foresters say that the birch is not a very desirable

tree in the southern mountains. It can seldom be sold for lumber and it occupies ground which could support more valuable timber. Consequently they are glad of an opportunity to dispose of it. The officials state that provision will be made to utilize the tree more closely than has been done in the past, and to regulate the cutting in such a way as to provide for a future supply.

PLANTING TREES IN COLORADO

By J. B. STONEKING, C.E.

BECAUSE of my connection with the School of Agriculture of the University of New Mexico, I am interested in anything that will forward the development and thriftiness of trees in the arid and semi-arid regions.

On a recent trip into Colorado, I made it my business to call on Mr. J. N. Salter, County Horticulturist of Pueblo County, and Mr. W. J. Morrill, State Forester, at Fort Collins, to get their views on a subject that has been much discussed in the public prints recently. I refer to the comparatively new idea of blasting tree holes with dynamite. I had both these gentlemen give me their views in writing so that I might not forget what they said nor misquote them.

Mr. Salter said: "I have seen powder used in planting trees and am frank to say it is the thing to do in planting orchards, especially in heavy or shaly soil. I really think it pays to use it in most of the soils in our state, as one is more apt to get the hole large enough to receive the tree."

Mr. Morrill wrote: "Foresters and arboriculturists generally recognize the efficiency of blasting holes for ornamental tree planting. The recent demonstration at the State Farm leads me to recommend the practice in street tree and lawn planting in hard soil, as the hole can be very cheaply excavated, and the loosening of the soil for several feet around undoubtedly will result in better growing conditions."

I found that a great many trees of all kinds, fruit principally, have been planted in blasted holes in New Mexico, Colorado and Montana, and the method is well spoken of wherever it is known.

The cost of explosives seems to average six or seven cents a tree. This is largely or quite counterbalanced by the saving in labor, as it is no easy task to dig holes with spades in the soil types of this region. But just consider that if it is so difficult to get a spade into them, what chance a tender rootlet has to force its way down and out into feeding beds for the plant food needed to nurture the tree.

The blasting work is very simple. Into an auger hole, twenty-four to thirty inches deep, a quarter-pound charge of dynamite is placed and tamped in. After the blast, the loosened earth is shovelled out, the pot hole at the

bottom filled—sometimes with manure at the bottom—then some sub-soil on which the young tree rests, filling around the roots with the richer top soil. The earth is then tramped down firmly with the feet.

LIGHTNING PLAYS FAVORITES

THE United States District Forester at Albuquerque, N. M., has just compiled some very curious figures showing the erratic behavior of lightning in starting forest fires. Yearly records going back as far as 1908 show that out of every 100 fires in the National Forests of Arizona and New Mexico, 40 originate from lightning. This general percentage of lightning fires is well known to foresters, says District Forester Redington, but it is surprising how widely the percentage varies with different localities. In northern and central Arizona, for instance, the proportion of lightning fires runs up to 70 per cent, while in the Manzano Forest near Albuquerque only 3 per cent of the fires are started by lightning. There is no readily apparent rhyme or reason in its behavior. In general, those forests bearing big timber and lots of grass seem to suffer worst, but a notable exception occurs in southern Arizona, where the proportion runs from 40 per cent to 60 per cent in spite of the timber averaging smaller and the grass somewhat sparser than elsewhere.

Forest officers state that the accumulation of figures of this kind is gradually adding very materially to the efficiency of their fire prevention system. It enables them to state the fire hazard on each forest in accurate figures instead of in words, and to calculate the risks mathematically, just as an insurance company does. This in turn makes possible a really intelligent and economical distribution of men and funds for fire prevention.

TREMENDOUS WASTE OF WOOD

THERE are more than 48,000 sawmills in the United States, and their output of waste in the form of sawdust, shavings, slabs, and other wood refuse is estimated as 36 million cords per year. This is equal to over 4½ billion cubic feet of waste, which is the capacity of a bin one-half mile high with a base covering a forty-acre lot. Or, considering each cord to contain eighty cubic feet of solid wood with all the cracks and air spaces taken out, these 36 million cords would make a block of wood more than a quarter of a mile on each edge.

Perhaps one-half of this so-called waste product is not, strictly speaking, wasted, but serves a useful purpose as fuel under the boilers. Much of the remaining 18 million cords not only serves no useful purpose, but in most cases is a source of inconvenience and danger, and costs the mill time and money.

HELP US TO GET 5000 NEW MEMBERS BY GETTING JUST ONE

200 Dead in Forest Fires

FRIGHTFUL forest fires in Nipissing and Sudbury Counties, northern Ontario, in the last few days of July, killed over 200 people, destroyed numerous villages and burned timber valued at hundreds of thousands of dollars. The fires were finally extinguished by rains. At this writing official reports are not in, but the newspapers tell thrilling stories.

At Nushka fifty-seven are known to have perished, says one paper. The French Canadian settlers there had been warned of their danger for three days, but had remained and fought the flames until the fires completely surrounded their village of a score or more of houses.

As the flames reached their homes the frantic residents resorted to any effort to save their lives. There being no river or lake not screened by the flames, many jumped into a single well and their bodies were found piled up above the normal water line.

At Cochrane, with a population of 1700 and the largest town destroyed, the residents fought the fires until the settlement was burning, and then most of them found refuge in a small lake, which soon was completely walled by flames. Into this body of water also plunged many wild animals, driven before the flames, and humans and beasts found a common and comparatively safe refuge, with barely their noses out of the water, while the roaring fires swept on. Eighteen, however, are known to have been killed at Cochrane and thirty-four injured.

At Matheson the relief expedition found thirty-four bodies lying side by side on the station platform of the Temiskaming and Northern Ontario Railroad. The station and two dwellings, far apart, are the only buildings remaining in Matheson.

Ramore, a smaller settlement, was obliterated and what became of its people is not now known. Like the residents of other towns, it is believed they fled through the woods and brush before the flames and probably were overcome and destroyed. Fifteen of Ramore's residents failed to leave in time and their bodies were found in the ruins of their homes.

At Iroquois Falls the great paper mills, costing \$8,000,000, and supplying the *Chicago Tribune* and other large newspapers with their print paper, were destroyed, with every other building in the place. All that remains are the stone foundations and brick walls of the plant, which was one of the largest in the world. The loss of life there has not been determined, but it is believed the paper company was able to get all of its employees safely away. The mills were owned by what was known as "*Chicago Tribune* capital."

Everything at Porcupine Junction was destroyed, excepting the railroad station, and it was near there that the rescue train ran through flames miles wide. So intense was the heat that the window panes in the cars

were broken and in several places the rails were warped so that the train had to proceed with great caution. All on board the train suffered intensely.

The fire was checked at Timmons after a score of houses had been destroyed, but it was said many persons who had fled in advance of the flames had been overtaken and probably burned to death.

A woman has come out of Kowccash with the story that while she went in search of aid the flames cut off her retreat to her home, which was destroyed, with her husband and their ten children. She said the flames completely encircled Kowccash and Tashota, and that there seemed to be no escape for the many persons trapped there.

A despatch from Toronto, dated July 31st, says: Premier Hearst announced to-night that scores of small settlements have been obliterated, one large town wiped out and another left mostly in ruins; that only a heavy rainfall saved a great part of the province; that 184 lives are known to have been lost; that hundreds of people are homeless and that the Government has taken extraordinary measures to provide for the refugees.

Reports to the Canadian Pacific Railway Company state that the figure of 184 dead represents the number accounted for up to 9 o'clock this morning.

Englehart despatches say the figures on hand early in the day indicated that at least 200 persons perished, with numerous outlying districts to be heard from.

WOMEN'S CLUB RESOLUTIONS

RESOLUTIONS adopted by the General Federation of the Women's Clubs, and reported to AMERICAN FORESTRY by Mrs. Lydia Adams-Williams, State Chairman of Conservation for the District of Columbia, embodied many references to subjects pertaining to forestry.

Governors were urged to set aside Burroughs' birthday, April 3rd, as an annual Bird Day; the American laurel was recommended as our national flower; a bill for a National Park Service was endorsed; measures providing that the Lincoln Highway run through Yosemite Park and that post roads be built on public lands open to settlement were approved; coördination of the work of the various departments of the Government and coöperation between state and nation in the conservation and utilization of the water resources was advocated; the extension of the Weeks Act for the purchase of land in the Southern Appalachians and in New England was urged; extension of time of the shooting season under the Federal Migratory Bird Act was opposed; and measures to prevent birds killing themselves by dashing against light-houses and for protection of Federal bird reserves were approved.

The Nation's Wishing Tree

NEXT to the tree immortalized by Longfellow in the "Village Blacksmith," the National Wishing Tree in Lafayette Square, Washington, D. C., cut down in January, was perhaps our most famous chestnut tree. The chestnut is thought by many to possess wonderful powers over fortune. Perhaps you have had your future foretold by the bursting chestnuts as they roasted on the hearthstone. Perhaps the sight of a familiar chestnut tree recalls the happy day of youth when you went chestnutting, and causes you to wish for a return of those joyous times. And perhaps you have made your wish under the Wishing Tree, and your wish has come true.

The National Wishing Tree was a dwarf chestnut, a scion from the famous Wishing Tree in Hyde Park, London. It was located immediately west of the Jackson statue, and in plain view from all the windows on the north side of the White House.

As implied by its name, the Wishing Tree was supposed to possess a magic charm which caused every wish made under its branches to come true. The "oldest inhabitant," quoted in the *Duluth Evening Herald*, says:

"There is no particular form of wishing, though the park attendant told me many years ago that most of the wishers went up close enough to the tree to put their hand upon its lower limbs. The wish must not be spoken, and must not be divulged.

"About forty years ago I was directed by the editor of the *Daily Chronicle* of Washington, on which paper I was then a young reporter, to explode the stories about the tree; to show that they were the rankest kind of superstition, and that wishes under an iron lamp post or anywhere else were just as likely to come true.

"I proceeded to do the exploding, and was perfectly satisfied that there was a perfect explosion. And so was the editor, Col. Robert Ingersoll, who for many years lived in a house which faced the wishing tree. He became interested in it, and in his many lectures on 'Superstition' he did a great deal more exploding.

"My first personal experience with the tree was when James Buchanan was President. The Prince of Wales—the late King of England—was the royal visitor. Miss Harriett Lane, a niece of the President, walked through the park with the prince one evening, on their way to the residence of Lord Lynn, then the English Minister at Washington, only a couple of blocks away from the White House.

"On their way they passed under the wishing tree, and Miss Lane told the prince its story, and that it was of Hyde Park and English stock. He became enthusiastic and, on her challenge, went under the tree, grasped one of its branches firmly and devoutly made a wish.

"I have seen other royal visitors under the tree, notably the Grand Duke Alexis of Russia, who recently passed away; King Kalakaua, of the Sandwich Islands,

during General Grant's administration, and during the Cleveland administration Queen Emsons, of almost equal rank in the royal way.

"This tree is also known to some of the habitués of the park as the nurses' tree, for the nurses gathered around it in preference to any of the other trees. Tea made of its leaves cured many disorders, and is said to have been especially useful in warding off attacks of whooping cough.

"I have been told that Abraham Lincoln, when President of the United States, went personally to the tree one night for some of its leaves, with which to make a draught for his third son, William Wallace Lincoln, the little fellow who died in the White House only a short time prior to the assassination of the President.

"In those days there was a high iron rail fence around the park, the pattern of the present fence around the White House. The gates being locked and no one knowing where the keys were kept, Mr. Lincoln personally helped his coachman as he climbed the fence to get the leaves.

"This tree figured in another way in President Lincoln's life, for it was evidence during the assassination trial that Atzerodt Payne and Dave Harold spent most of the afternoon preceding the tragedy in the seat under the tree. From this seat the best view is obtained of what is taking place on the outside of the White House.

"Singularity enough, it was in evidence during the trial of Charles J. Guiteau, as also in his confessions and admissions, that he, too, had spent a great deal of his time during the five days that he declared he was under an inspiration to kill President Garfield in that identical seat. He used the seat, he said, as others had, for the same reason that actuated the Lincoln conspirators; it afforded the best view of the White House. He also said that he had found that particular seat more restful than any other in the park, and that it was while he was sitting in it that he received the incentive to commit his terrible crime."

THE FIRST SOUTHERN FORESTRY CONGRESS

AT ASHEVILLE, North Carolina, the cradle of American forestry, where, in 1898, Gifford Pinchot demonstrated that forests could be utilized without destroying them, was held the first Southern Forestry Congress, on July 11th to 15th. This meeting was notable for the number of professional foresters in attendance, and for the practical and instructive character of the program. The States of Kentucky, Tennessee, Texas, Maryland, Virginia and North Carolina were represented by their state foresters, three of whom, Besley of Maryland, Maddox of Tennessee and Barton of Kentucky, presented papers on state problems. Louisiana was represented by Professor J. G. Lee and Henry T. Hardtner, whose talk on the practical experiments in

natural reforestation of long-leaf pine was a feature of the session. The National Forest Service was well represented. Chief Forester, H. S. Graves, discussed the southern forests and their place in the national timber supply. Supervisor I. F. Eldredge of the Florida National Forest gave an illuminating talk on the perpetuation of the turpentine industry and W. W. Ashe discussed the forests of the future, second growth, in the light of commercial results. Much attention was devoted to state organization for fire protection, and the fire problem in the southern pineries. This subject was presented by H. H. Chapman of the Yale Forest School. Director J. W. Toumey of the Yale School discussed the regeneration of southern pine forests. President Charles L. Pack of the American Forestry Association called attention to the work of the Association in an address of greeting. This formal program occupied two entire days, during which the attendance was large and the closest interest paid. The evenings were devoted to recreation, consisting of a Dutch supper and a banquet, respectively. The resolutions adopted by the Congress urged the States of Florida, Georgia, South Carolina, Mississippi, Arkansas and Alabama to undertake some form of state forestry organization modelled after the principles successfully worked out in other southern states, of employing technical foresters under boards free from political pressure. The Congress expressed its disapproval of the combination of forestry with fish and game protection either through wardens or commissions as tending towards loss of efficiency in both organizations. It commended the State of Louisiana for passing the recent amendment to the state forestry law creating a fund for forestry, and establishing an advisory board to supervise the expenditure and the employment of a technical forester. Two field days were alternated with this program. On July 12th the Biltmore forest plantations were visited in carriages. These plantations, now fifteen to twenty years old, have proved successful, for the most part, wherever the species was adapted to the soil conditions. Wonderful stands of white pine and short-leaf pine were seen. There were many failures amongst the hardwood plantations on poor soil. The planting of pine was in most instances closely spaced, 3x3 feet, or 2x4 feet, and already shows stagnation due to crowding, bearing out the contention of most American foresters that close planting is more of a drawback than an advantage. On Friday, July 14th, an automobile took the delegates to the summit of Mt. Pisgah, whence they descended to the "Pink Beds," a forest which in the spring is full of laurel bloom, and in the fall shows the pink and red foliage of the chestnut oak. An excursion to Mt. Mitchell was planned for Saturday the 15th, and a few hardy individuals defied a steady rain and took the trip. The rest abandoned the plan. Those who left on Friday or on Saturday to the westward reached home in season. But the Mt. Mitchell excursionists, those who remained in Asheville, and a party of ten foresters, including Forester H. S. Graves, J. W. Toumey and others who left for Washington at 2.30 P. M., all were caught in the tre-

mendous floods of Saturday night when the rain, descending steadily and without wind, the entire night, equalled a total precipitation in 24 hours of from ten to fifteen inches in the various mountain zones. Mr. Graves' party was stalled at Marion, North Carolina, from Saturday night until Friday the 21st, during which time first-hand observations were made of flood conditions and effects.

Many lumbermen, railroad men and private land owners interested in fire protective organizations were present at the Asheville meeting. The delegates were unanimous in the feeling that they had been greatly benefited, and carried away many practical ideas and much enthusiasm. The Congress marks an epoch in the development of southern forestry. It presented in clear, compact form the great progress that has been made and served as an impetus towards further effort in this immense region where the entire problem of future management of forest land is as yet in its infancy. Great credit is due to Dr. Joseph Hyde Pratt, State Geologist of North Carolina, and Joseph W. Holmes, State Forester, for organizing and conducting the affairs of the Congress. A permanent organization was effected, and the above officials were elected president and secretary respectively.

FORESTRY BOARD'S SECRETARY

BY GENERAL C. C. ANDREWS

Secretary Minnesota State Forestry Board

IN recent numbers of AMERICAN FORESTRY there have been articles almost insisting that in the organization of forestry in the various states, the office of secretary of a forestry board ought to be filled by the state forester. If that plan is the best for a state's forest service, it should be followed. But has the subject been carefully enough considered?

A forestry board appoints the state forester, and directs and supervises his work. At its meetings it listens to his statements and recommendations, and then instructs him as to what he shall do. These instructions—some of which he may possibly dislike—are to be carefully recorded and complied with. Does it tend to the best efficiency to have him the recorder and sole custodian of these instructions?

The various states ought now to plant and soon will plant a thousand or more acres of forest annually, and before many years each state will require assistant foresters to manage state forests. At the beginning of the present war in Europe, the German states had in the aggregate 12,000,000 acres of state forest, a trained forester for every 10,000 acres, and planted 100,000 acres of forest annually. It is reasonably certain that the work and responsibility of state foresters in this country will, in a very few years, greatly increase, and, speaking from eighteen years' experience as secretary of a forestry board, I believe that it will be for the public interest that the organ of communication between the forestry board and the forester and keeper of the board's records should be a disinterested person, and not the forester himself.

Editorial

THE FLAW IN INDIANA'S STATE FORESTRY ORGANIZATION

INDIANA has had a State Forestry Board for fourteen years, and a secretary, who by the terms of the law is supposed to be "one who shall have special knowledge of the theory and art of forest preservation and of timber culture." The State has during this period appropriated an average of \$8000 per year for forestry work. To-day, those who have the forestry work of the State closest at heart are disappointed and dissatisfied at the results. In adjoining states, under the guidance of trained men, and under plans similar to those contemplated for Indiana, great areas of state forest reserves have been created, state-wide fire protection systems organized, and, more to the point, immense progress has been made in educating farm owners in the proper care of their woodlots and in selection of profitable trees to plant. Demonstration woodlots have been established, lectures given, and bulletins issued. The people of these states are not forced to content themselves with enthusiasm and sentiment—they are guided to the practical application of their impulses by the efficiency of their state foresters.

In Indiana the contrast is sharply evident. As a result of fourteen years' effort on the part of the State Board, which has at all times given conscientious and unselfish service, the State has 2000 acres in Clark County, on which some hardwood plantations have been established, but the educational and publicity work which is the foundation of true state forestry is totally disorganized, inefficient and conspicuous chiefly by its absence. This Board, by the very terms of the law constituted as a non-political body and containing representatives of the faculty of Purdue University, the wholesale and retail lumbermen, and the agricultural interests of the State, has year by year endeavored to fulfil its obligations to the people of the State, only to confess its efforts nullified and barren of results.

What is the trouble? It lies in *the law itself*, which gives the Board no control whatever over its executive officer, the secretary, upon whom rests the duty of carrying out the purposes of the work. In practically every other state similarly organized the Forestry Board appoints its own state forester, who serves the Board but is not himself a member. Other states whose laws prescribe the employment of a technically trained forester have actually employed one, and even when this qualification has not been indicated by law, the state forestry boards have insisted on securing foresters whose ability has been demonstrated by performance. Such foresters are now serving boards in the States of New Hampshire, Vermont, Connecticut, New York, Maryland, New Jersey, Virginia, Kentucky, Michigan, Minnesota, Texas, California, and elsewhere. Indiana, on the contrary, is the only State

in this entire nation which has first created a Board of Forestry and then stripped it of all control over its executive officer. In this State the governor appoints the secretary or forester, and the latter is a member of the Board itself. The Indiana law, passed in 1903, demanded of its secretary a special knowledge of the theory and art of forest preservation and timber culture. Even at that time men with the proper training were not lacking from whom to choose. But the first appointee was a school teacher to whom the governor owed a political debt. This secretary remained in office till 1909 and accomplished the purchase of the state forest reserve and its improvement by roads and buildings. Trees were planted, but upon his retirement no records of these plantations could be found, and thus much of the benefit of the work was lost to the public.

In 1909 Governor Marshall made an honest endeavor to secure a capable man. His appointee, while not a forester, and lacking fundamental knowledge of soils, tree culture, and woodlot management, yet had a knowledge of botany and a true scientific interest in forestry. He secured very complete records of plantations and gave to the State practically all that it has ever received of value from the expenditure of the annual appropriations for maintenance. But in 1912, against the protests of the Board of Forestry, who had in him secured a man who was trying to do something, this secretary was removed on the suspicion that he was of the wrong political faith, and a tried and true member of the dominant party was given the office as a plum. During the four years in which he has held office the present secretary has made no pretense either of knowing anything about state forestry or of endeavoring to conduct the work of state forester. Correspondence requesting information on forest planting or woodlot management remains unanswered, the state reserve is left to a caretaker, and the Forestry Board finds itself in an impossible situation.

To allow such a condition to continue would be a confession that Indiana must fail where her sister states have succeeded. One change alone is needed—the Board should appoint and employ its own secretary and forester and must be limited in its choice to men who have received an educational training which fits them for the position. There would be no disposition on the part of a State Forestry Board properly constituted, as is that of Indiana, to employ a man who would render their entire work futile and barren of results. This change should be secured in the coming session of the Indiana Legislature. Nothing else is needed to place Indiana on a par with other states and to justify the further continuance of the forestry work of the State. Without this reform the entire system may well be abolished.

THE VITAL ISSUE

FOR twenty-five years, or since March 4, 1891, when President Benjamin Harrison was given power by Congress to set aside public lands bearing timber as forest reserves, a perpetual struggle has been waged in this country between the advocates of two opposing theories of government. On the one hand are ranged the advocates of individualism, who hold that the greatest good can come only through the passing of all our national possessions into private ownership to be developed and exploited free from government interference or regulation. Opposed to this doctrine are the champions of public control, and especially of retention under public ownership of the remaining non-agricultural lands bearing timber, water power, or minerals, which are still owned by the nation, and their development and use under wise restrictions, for the benefit of the people as a whole. The old traditional policy of the United States, possessing absolute ownership of its vast new territories both east and west of the Mississippi, was to develop this region by disposing of the public title and entrusting all resources of whatever kind to private ownership. The principle of the homestead law, and of the stone and timber act, was to benefit the individual by giving to him 160 acres of farm land or public timber at a cost only sufficient to defray expenses to the Government. A pioneer civilization, with limitless undeveloped wealth in field and forest, rested its hope for rapid growth on the individual. To benefit him, to bestow a rich competence upon whoever had the hardihood to conquer the wilderness, was to create increased values by the very effort of these pioneers, and establish the foundations of civilization.

Our social progress was made to depend upon the frontiers, which became the solution of all pressing problems. The venturesome, the unfortunate, the sons and daughters of farmers on impoverished eastern soils, the city dweller, had only to go west and start life anew, borne along by a contagious optimism and energy which is the ruling spirit in all new communities. The Government, with a lavish hand, gave of its wealth not only to farmers, but bestowed more than 80,000,000 acres of its domain on the western states, to be in turn disposed of by these states, for the most part, with equal liberality, for sums representing but a fraction of their real or prospective value, that the individual might benefit. Railroads received grants whose extent would feed empires. This entire policy, wonderful in the extent and rapidity of its results, and typically American and pioneer in its ideals, is based on the single conception of individualistic effort as the sole means of furthering public or social welfare, and as the only practical method of utilizing for public good the natural resources originally owned by the people, as a whole. Whatever the future may hold in store for us as a nation, it is the sincere hope of every American that we may retain the vigor and independence which is the fruit of this spirit of self-expression.

But civilization is the result no less of the forces of co-ordination, co-operation and of sacrifice of individual

prerogatives whenever they conflict with public welfare. When a single theory of government is permitted to dominate, it may end by destroying. If America permits the doctrine of individualism to thwart all efforts at logical and necessary development towards higher and greater ideals, and more permanent and universal content and prosperity, then as practical Americans we must question the infallibility of those who uphold this doctrine.

The withdrawal of public timber lands in 1891 was the first blow struck at this infallibility. Why was this done? Because it had already in that early day been shown that the unchecked operation of the principle of private possession of timber would end by destroying the forest resources of the country, literally "root and branch." The recuperative powers of Nature, 'sufficient under ordinary conditions to maintain not merely the forest cover but the protection of the more valuable timber trees in the stand, failed before the wide clean sweep of modern logging, and the immense increase and continuity of modern forest fires. It became evident to thoughtful owners that Nature, confronted with new and disastrous forces of destruction, must be aided by man's controlling mind, if the equilibrium were to be restored and future forests assured.

At the outset, it was clear that this demanded a central directing intelligence. The individual, left entirely to himself, has so far consistently failed, through no fault of his own, to subordinate his private welfare and profit to a future and distant goal of communal good. Public sentiment groping for expression, vaguely resentful and apprehensive in witnessing the progressive spoliation of timber resources upon which much of future prosperity is bound to depend, sought means of correction, and still seeks it. Various futile or impractical plans are frequently proposed in state legislatures to force timber land owners to restrict the cutting of trees below certain diameters, or to reforest cut-over lands. These efforts of the public consciousness and foresight to curb the destructive tendencies of individualism have so far been unavailing, and are so opposed to our national traditions that their advisability is seriously questioned.

A second channel of effort, promising better results, was that of public education. To persuade forest owners that better methods of management for their woodlands is possible, still leaves the choice with the individual. Since by far the greater part of our woodlands are and will remain in private ownership, the more that can be done to stimulate owners to care for their property, the better, but if they choose to waste their timber lands, they cannot at present be effectually prevented from doing so.

But what about the remaining timber resources, to which national title was still clear? Should these go the way of all the rest, and be lost to the people through the operation of the homestead laws, stone and timber claims, placer mining locations, land "scrip" and other means of obtaining patents? Should the nation relinquish its remaining store of public timber, to be despoiled in turn, and then in

the future be forced by the fearful consequences of economic folly to repurchase these very lands, as we are now doing in the Appalachians? A ruined forest can be restored to natural condition wherein the valuable timber trees predominate only by excessive cost, and often not at all. Worthless weeds and brush, persistent and vigorous, exclude the desired pines and hardwoods. On the other hand, the forest in its natural state can be so handled that the per cent of the better timber trees is greatly increased in the new crop. But to accomplish this the logging must be done under regulations and supervision of an extremely intelligent type, based on close scientific study of soil, light, seeding and other factors, whose control means success, and whose neglect spells failure. Once determined, the rules are simply applied and the increased cost of logging is neither impractical nor unreasonable.

American intelligence gave but one answer to this problem. The public timber lands must be retained, and their wealth of timber made available only under expert supervision. This idea is diametrically opposed to the primitive plan of reckless disposal, yet falls far short of state socialism. It is, in effect, the application of the same business principles between the public and the private corporation or individual as are made the foundation of all transactions between two persons. An owner of timber lands has, by right of his possession, the power to fix the terms under which a logging contractor may cut and remove the standing timber. He will, if he is wise, draw a contract in such form that the minimum of damage will be done to his forest. This "revolutionary" principle, adopted in 1891, and under which 160,000,000 acres of public timber lands are now being managed, consists in applying the same idea to public property. Thus, the use of the timber, through timber sales, is encouraged, logging contractors do business as usual, and there is no change in the economic situation, except that public consciousness has awakened to the point of guarding its future interests effectively upon those lands which it still owns and controls. Private corporations can still obtain the timber, but they can no longer get it on their own terms and completely ignore the rights of the original

owner; no longer cut indiscriminately and abandon the land or attempt to sell it to farmers as agricultural or fruit land, for which it is wholly unfit.

In adopting this simple but effective change in our public land policy, we have made a distinct step towards modifying and curbing the dangerously destructive tendency of individualism as applied to forest lands. The same tendency is manifested in the prolonged struggle over water-power legislation, involving technical questions so deep that the general public despairs of understanding on which side lies the right. The control or retention of coal lands, oil lands and other minerals brings on the same point. What we must determine as Americans is this: Does our present and future welfare depend more closely upon unchecked and unregulated private acquisition of public resources, or upon their retention under public ownership, and development under contracts or leases, by which private capital is regulated in the interests of the public good? This is an economic question which we must master and decide now. Once these lands have passed into private hands, we have made our choice and the cost of reacquisition may be prohibitive.

The champions of unbridled private acquisition, by appealing to popular tradition, equity between states, Americanism, distrust of government, and opposition to bureaucracy, and by urging the primal reason of development and prosperity, seek to throw dust in the eyes of the public, and profit as of old, by obtaining from complacent congresses and officials the right to do as they please through actual possession of title. Are we to permit ourselves to be deluded by these arguments, or shall we awaken as a people to the full measure of our national responsibility, and hold with a firm hand the control of our great but dwindling national timber lands and other resources? "Without a vision the people perish." Let our vision be the strong blending of private enterprise with public regulation, that we may show to the world an efficiency equal to that displayed by our neighbors across the seas, and a preparedness sufficient to cope with any crisis.

\$10,000,000 FOR FOREST ROADS

ONE of the provisions of the Federal aid road bill, which was signed by the President on July 11, appropriates \$1,000,000 a year for ten years to be spent by the Secretary of Agriculture for the construction and maintenance of roads and trails within or partly within the National Forests.

The bill provides that, upon request of the proper officers of the states or counties, the money shall be used for building roads and trails which are necessary for the use and development of resources upon which communities within or near the National Forests are dependent. The work is to be done in coöperation with the various states and counties. Not more than 10 per cent of the value of the timber and forage resources of the National Forests within the respective county or counties in which

the roads or trails will be constructed may be spent. Provision is made for the return of the money to the Treasury by applying 10 per cent of the annual receipts of the National Forests in the state or county until the amount advanced is covered.

Officers in charge say that the bill will make possible the construction of many roads which are greatly needed. Since 1913 ten per cent of the receipts of the National Forests have been used in road and trail building, but the funds have been inadequate to meet the needs. Many isolated communities within the National Forests are entirely dependent on the Government roads and trails. The money now made available will permit the construction of many roads necessary to open up inaccessible territory.

Lumber Uses

BY WARREN B. BULLOCK

THE greatest development for public information of the need for conserving American forests has been seen since the tenth of July at Chicago, in the lumber classification hearing conducted by the Interstate Commerce Commission, in which all freight traffic conditions involving the lumber industry are being exhaustively studied, both from the standpoint of the lumberman and the carrier. The public, however, is being shown the great need for nation-wide steps for the conserving of the forests by the testimony of the lumbermen of the great waste in the industry, owing to the inability of the lumbermen, because of traffic and general trade conditions, to utilize the bulk of their wood supply. It was shown that nearly 65 per cent of the nation's forests is wasted, and never reaches the consumer in any form. Some of the manufacturers have testified that they are able to utilize part of the waste of their mills in converting smaller products of the log into box lumber, but in many cases they are too far from the market to make this utilization of their timber profitable.

THE hearing was scheduled to take up the problems of classification of lumber products, but soon became a general study of the entire lumber business in its shipping relation to the public. Better shipping conditions, it was testified, would greatly aid the lumber manufacturers in utilizing the portions of the tree which are now wasted. Some interesting testimony was given on the relation of mills to their timber supply, and the need for the cheap transportation of logs to the mills, and the necessity for the mills moving to the timber supply when freight rates become too high, owing to the increasing distance from the forest to the mill. There is a point, it was testified, when the mill can not afford to ship the log to the mill, because of the distance to be traversed, and when such time comes it is necessary to move the mill to the source of supply. The need for favorable freight rates to allow the shipment of portions of the log which would otherwise be wasted was thus emphasized. If suitable shipping conditions can be assured, the lumber manufacturer can find a market for portions of the product which do not produce at present sufficient revenue to pay for shipment to the market.

THE World's Salesmanship Congress at Detroit provided another phase of the need for economy in wood products, and the preservation of the sources of future wood supply, in the forcing home of the realization of the part efficient salesmanship may provide in

saving the lumber supply. Proper salesmanship, it was shown by several speakers, will, by efficient disposal of the product of the mills, prevent an economic waste, by raising the standards of wood using to the point where profits for the manufacturer will be high enough to enable him to turn his attention to the utilization of waste. At present the lumber manufacturer is so closely pressed that he can only afford to market the cream of the forest, where the national need is for a market condition that will force him to utilize every portion of the tree. If the market for the cream of the forest is sustained to a point where the manufacturer is actually making a profit on his entire investment, the nation can require him to manufacture and sell the "skim milk" that is now thrown away.

OF ALL the woods used in the manufacture of tobacco pipes, French briar is undoubtedly preferred by the majority of smokers. This is the root of the white heath (*Erica arborea*), or "bruyere," which grows extensively in southern France and in Corsica. The white heath is a shrub which sometimes grows to a considerable size. The roots are gathered in large quantities, cleaned and sawed into pipe blanks or blocks of various sizes and shapes, after which they are placed in a vat of hot water and simmered for 12 hours or more. This gives them the rich yellowish-brown hue for which the best pipes are noted.

The value of the French briar pipe blanks imported into the United States for the year 1915 was almost \$300,000. In addition to this, there were imported, also, a large number of finished pipes.

The present scarcity and high price of French briar has led a number of pipe manufacturers in this country to look for a substitute, and quite a good deal of mountain laurel root is now used. This root is quite similar in appearance to the French briar root, but is softer and burns out more readily. Uncle Sam's Forest Products Laboratory is making some experiments in the hope of finding a satisfactory method of hardening this wood, so that it will not burn out. Several pieces have already been hardened to a very appreciable extent, but the process has not yet been perfected.

The laboratory has also been seeking substitute woods which will not need to be treated. At least one of these woods gives good promise of meeting the requirements of that class of pipes which are now made of applewood, though it does not have the figure typical of briar. It is of interest to note that the State of Pennsylvania alone uses over 120,000 feet of applewood yearly in the manufacture of pipes, and this is more than half of the total consumption. Other species, in the order of importance,

are as follows: French briar, red gum, ebony and birch. Other woods used in the making of pipes are olivewood, rosewood, and osage orange. The laboratory has started an investigation of the wood and roots of a number of the various species of chaparral which are so abundant in the State of California, and which give promise of yielding material the equal of French briar in every way.

FEW realize the important part that wood plays in the manufacture of shoes. Practically every shoe is shaped over a wooden last, the life of which, owing to the very rough usage and the frequent changes in styles of footwear, rarely exceeds one year. About twenty million lasts are produced annually at a cost of over one and one-half million dollars. The greater portion of these are made from maple, the price of which

has advanced to such a degree that the manufacturers are forced to find a suitable substitute or to decrease their manufacturing costs. One of the most expensive items of the manufacturing process is drying the wood. At present the rough turned last blocks are air-seasoned under cover for several months and then kiln-dried. This necessitates a large investment in stock, interest on the investment, fire insurance, and the cost of repeated handlings. In an effort to eliminate a considerable portion of this expense one of the large manufacturers is co-operating with the forest products laboratory in an effort to perfect a method of kiln-drying the blocks green from the mill. Sufficient progress has been made to indicate that a solution of this problem will be found. Hundreds of rough turned green blocks are being dried in the laboratory experimental kilns in a very short time and with promising results.

Wood Preserving Department

By E. A. STERLING

THE continued popularity of creosoted wood-block pavements is indicated by the new contracts which are coming out from time to time during the summer. These include 66,140 square yards of streets in York, Pennsylvania, specifications for which call for wood block, as well as other materials, involving a total of about 2,400,000 feet of lumber. In Kansas City the contemplated pavements will involve about 39,227 square yards; while Fort Worth, Texas, has awarded a contract for about 30,000 square yards on the main street in that city.

A MEETING of Committee No. 2 of the American Wood Preservers' Association on Specifications for the Purchase and Preservation of Treatable Timber was held on July 22nd, in Chicago. The chairman, Mr. A. R. Joyce, presided, and plans were made for the work of the Committee during the year. These involve recommendations of specifications for insertion in the "Manual," an analysis of the conditions which influence the availability and cost of railroad cross ties for treatment, an investigation of the life and service of treated ties and other material in the East and Southeast, and other details on the subjects assigned.

AS PART of the educational work which the lumber industry is now engaged in, exhibits showing models of farm buildings, samples of commercial woods, and other interesting materials, will be shown at a number of the larger state fairs this fall. These exhibits will include samples of treated material, such as creosoted

fence posts, creosoted barn sills, and boards and smaller dimension timbers which it would be profitable for the farmer and home builder to use. Although the preservative treatment of timber has become so well established as a commercial practice, it remains more or less a mysterious process to the small consumer, and the aim is to show how simple and economical the practice is when applied to small quantities of wood for home use. In a recent bulletin of the National Lumber Manufacturers' Association on "Preservative Treatment of Farm Timbers," it is stated that "The saving is another point which does not need to be reckoned closely, since it is so certain that satisfactory results will be obtained. From the many cases where pressure creosoted timber has shown no signs of decay for 40 years or more, down to the extra life which a light brush treatment will give, many gradations in results are obtained. There is no question as to the economy of a creosoted cottonwood post, which lasts 20 years, when one without treatment decays in three or four, nor of having sills, basement flooring, fences, gates and lumber in many other forms last at least two or three times the normal life.

"The most enthusiastic advocates of treated material are those who have used the largest quantities. Most of the large railroads of the country creosote their cross ties and bridge timbers, and from this large use down to the smallest consumer, results are almost invariably obtained which are in keeping with the thoroughness and care with which the work is done. By creosoting all farm timbers exposed to decay, and by using reasonable care to secure at least a uniform coating or penetration, a saving will result which will make for economy, permanence, and attractiveness of nearly all farm structures."

What Our Members Think of American Forestry

"Enclosed is \$3.25 to renew my membership for 1916. This is one of the subscriptions I like to make."

H. R. CHRISTIE,
Victoria, B. C.

"Allow me to congratulate you on the wonderful new dress and features of AMERICAN FORESTRY, which is now one of the very handsomest of all class or other publications published anywhere, and should surely appeal, not only to your regular clientele, but also to all who are interested in outdoor life as well as the special subjects on which it treats."

J. G. WILLIAMS,
Boston, Mass.

"I wish to congratulate you on the very entertaining and valuable Ornamental and Shade Tree Department in the AMERICAN FORESTRY. Among my circle of friends I have heard most favorable and high praise."

N. M. GOODYEAR,
Carlisle, Pa.

"I shall take this opportunity to say a word of commendation for your magazine. It has been a great help to me, personally, in keeping me in touch with forestry even though I am not, at present, following the course I studied while in college. The fellows who frequent our reading-room appreciate the value of the magazine and constantly refer to it."

F. H. HOEHLER, *Executive Secretary,*
Y. M. C. A., Cincinnati, Ohio.

"I want to congratulate you upon your admirable number of AMERICAN FORESTRY for February and the splendid and timely achievement in getting an article on Pine Rust."

JOHN B. WHITE,
Kansas City, Mo.

"Your publication is an admirable one—instructive and interesting—and I want to see it succeed."

W. C. EGAN,
Highland Park, Ill.

"The addition of a Department of Arboriculture to the magazine enhances its already very great value. The change of form and broadening of scope accomplished last year greatly improved an already excellent publication. The spirit and tone of its editing are such as to make every member of the Association feel a pride of ownership in and cooperation with it."

GEORGE W. ROSKIE,
Custer, S. D.

"We can justly feel proud of the AMERICAN FORESTRY magazine. It surely has made great strides in the last few months."

EUGENE W. MENDENHALL,
Clintonville, Ohio.

"I am delighted with the magazine more and more all the time, and even though I am not doing active Club work this year, I am just as good a forester as ever, and look for the magazine each month."

MRS. FOSTER ELLIOT,
Los Angeles, California.

"I want to say I greatly appreciate the wonderful improvement in AMERICAN FORESTRY in the past few months. It must become a wonderful factor in our conservation movement."

CHARLES N. THOMPSON,
Buck Hill Falls, Pa.

"I find your magazine, AMERICAN FORESTRY, very instructive and beautiful."

MARY AMORY GREENE,
Croton-on-Hudson, N. Y.

"Please let me take this occasion to compliment you on the great improvement both in form and substance which AMERICAN FORESTRY has undergone. It has developed into a most excellent magazine of great educational value. I am hearing praises of it on all sides."

DON CARLOS ELLIS,
San Francisco, Cal.

"I like the magazine very much indeed and gladly subscribe to what all your other friends have been saying about it all these last months. May it keep on prospering and win more friends both for itself and for the great cause for which it speaks."

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"I have just had time to look hastily over the magazine for June. It is a beautiful piece of work, and I hope will receive a little of the large amount of appreciation it deserves."

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Chicago, Ill.

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W. B. HAVELOCK,
Brocklesby Park, Lincolnshire, England.

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J. S. WILLIAMS,
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Chaffee Leaves State College

Professor R. R. Chaffee, who has been for five years Professor of Lumbering in the Department of Forestry at the Pennsylvania State College, leaves September 1st to take a position as Forest Engineer with Wheeler & Dusenberry Lumber Company, Endeavor, Pennsylvania.

Mr. Chaffee graduated from the Harvard Forest School in 1910. He was in United States Forest Service in District 6 from 1910 to 1911 and since that time has been connected with the Forest School at the Pennsylvania State College. He has had charge of the work in lumbering and has specialized in forest utilization, logging and milling methods and products. At Endeavor he will devote considerable time to forest utilization, laying out of future operations, analysis of production costs, etc. While at State College he has been in charge of the trips which are made by the senior class. These logging trips have carried him into the Lake State region, Southern Pine region, the Cypress region, the Adirondacks and the Appalachian hardwood region. He is a member of the Society of American Foresters and of the American Forestry Association.

H. J. Kaestner Resigns

H. J. Kaestner, who for the past couple of years has been the forester for the Department of Forestry, Game and Fish of West Virginia, has resigned and accepted a position with the Wm. M. Lloyd Lumber Company of Philadelphia, Pennsylvania. He reports the work there as particularly pleasant, as he is back in his home city after an absence of six years.

Credit to Dr. Purdue

Dr. A. H. Purdue, state geologist of Tennessee, was inadvertently not given credit for taking the excellent photograph in the first part of the article by W. R. Mattoon in the May issue of AMERICAN FORESTRY.

Forest School Personals

Dr. H. P. Baker of the State College of Forestry at Syracuse addressed the members of the Conservation Department of the Federated Women's Clubs of America at the Conservation Conference held in New York City. The subject of Dr. Baker's address was "State Forestry." About 600 women were in attendance at this conference.

At the recent meeting of the Southern Forestry Congress held at Asheville, North Carolina, Dr. Baker, of the Forestry College at Syracuse, gave the response from the North. Two films of motion pictures, showing the activities of the College in instructional and extension work through the State, were also exhibited at the Convention.

Professor F. F. Moon of the College of Forestry at Syracuse attended the recent meeting of the Pennsylvania Forestry Association held at Reading, Pennsylvania.

The Beal Nursery

In honor of Dr. William James Beal, professor emeritus of botany at the Michigan Agricultural College, the forestry nursery maintained by the Forest Service at Tawas, Michigan, has been given the name of the "Beal Nursery." Dr. Beal was the first man to make forest plantations in Michigan and for over forty years has been closely identified with the subjects of botany and forestry. He is a widely known writer on these topics and is a member of a number of scientific associations. In 1910 he retired from active work and now makes his home at Amherst, Massachusetts.

The Beal Nursery supplies planting stock for the Michigan national forest. It has a present annual capacity of about 100,000 seedlings and transplants, which will be increased to 500,000. The trees will be used for reforesting denuded areas.

Annual Forestry Conference

The annual forestry conference in the White Mountains will occur at the Crawford House in the Crawford Notch, New Hampshire, September 5th to 7th, 1916.

This conference, under the auspices of the Society for Protection of New Hampshire Forests and the New Hampshire State Forestry Commission, held at a central New England point, has come to be a gathering place for New England Forestry interests. This year the program will be no less interesting and varied. Dr. Fernow, Director of the School of Forestry at the University of Toronto and President of the Society of American Foresters, will be present, as will Professor Filibert Roth, Director of the Department of Forestry, University of Michigan, and William L. Hall of the Forest Service.

The keynote of the meeting will be national forest administration in view of the fact that the Government has lately acquired 305,000 acres or 477 square miles in the White Mountain region.

There will be addresses illustrated with lantern slides showing the situation in the National Forest in the West and the new National Forest in the Southern Appalachians and in the White Mountains. Excursions will be made to different parts of the National Forest near the Crawford House and into the magnificent primeval spruce timber that stands nearby upon the 6000 acres of forest land in the Crawford Notch recently acquired by the State of New Hampshire.

A New Seedman

Thomas J. Lane, of Dresher, Pennsylvania, for the last fourteen years with Thomas Meehan and Son, of Dresher, Pennsylvania, who have recently discontinued the seed business, which they had conducted for fifty years, has taken up the seed business in his own behalf and his thorough knowledge of the business makes him feel confident that he will do well.

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Canadian Department

BY ELLWOOD WILSON

Secretary, Canadian Society of Forest Engineers

B. M. Winegar, Forester to the Operating Department, Eastern Lines, Canadian Pacific Railway, has just returned from a trip through the Maritime Provinces. The Canadian Pacific is planting trees and shrubs around the stations and also planting trees to take the place of the snow fences made of boards which are used to keep the snow from drifting on the tracks in winter.

Major J. B. White, of the 224th Forestry Battalion, C. F. E., has cabled that he will soon return from England to recruit another Woodmen's Battalion, of which he will be the Colonel.

Lt. C. H. Morse, 224th Forestry Battalion, C. F. E., writes from Bramshott Camp, England, that the men are hard at work learning infantry drill and tactics as well as doing logging work.

The extraordinarily wet spring has been most favorable to tree growth in Quebec, Norway spruce showing already nearly a foot in height growth, Scotch pine and white pine, fifteen inches, and Jack pine, eighteen to twenty-four inches. Insect pests have not been troublesome except the elm-leaf aphid.

Mr. Arnold Hanssen, member of the Canadian Society of Forest Engineers, and for four years with the Laurentide Company, Ltd., in the Forestry Division, is going to Yale this fall for a post-graduate Forestry course.

Mr. H. C. Schanche, who has been with the Laurentide Company, Ltd., in the Forestry Division, is returning to Penn State to finish his Forestry course.

Mr. Earle Spafford, who was for some time with the Forestry Division of the Laurentide Company, Ltd., and is now with the Tobacco Products Company, in Boston, came to Grand Mere to arrange for a long vacation trip into the northwoods of Quebec this fall.

In spite of the successes of the Allies, recruiting is as active as ever and several new infantry battalions are soon to be authorized.

Mr. L. M. Ellis, of the C. P. R. Forestry Staff, writes from Calgary that so many men have enlisted and there is such a demand for labor in munition factories and in construction work that the farmers will have extreme difficulty in obtaining labor to harvest their crops.

Five men were graduated in forestry at the University of New Brunswick on May 17th. Messrs. C. E. Maimann, who is now a corporal in the 58th Howitzer Battery at Fredericton; Mr. James Burns, who takes up work as an instrument man in a Crown land survey party going out near Campbellton; Mr. Leland S. Webb, who goes out on reconnaissance work with the Dominion Forestry Branch in Manitoba; Mr. Edwin Hall, who will be in Saskatchewan, and Mr. Colby S. Jones, who will likely take up the work of lumbering with Jones Brothers, at Apohaqui, New Brunswick.

Among the other forestry students going out on work for the summer are George Miller, James Smart and Leo C. Kelly, of the Junior class, with the Dominion Forestry Branch. With the Crown Land Department of the province, in parties now organized, are: R. Melrose, R. D. Jago, Percy Crandall, A. M. Brewer, Austin P. McDonald, Cy Young and Lee S. Kilburn. Prof. R. B. Miller will also be engaged with the Crown Land Department on the study of growth and volume.

Public sentiment in Canada on the question of forest protection and the need of guarding more than five thousand wood-using industries from the menace of forest fires has reached a point which none of our governments, Provincial or Federal, can safely ignore. Through the efforts of the Canadian Forestry Association and other bodies, the facts regarding Canada's dependence upon cheap and abundant wood supplies, and the enormous damage wrought annually by preventable fires, have been made matters of common information in town and country from coast to coast.

Three field parties are now at work in New Brunswick, in connection with the forest survey and classification of Crown lands. The project is under the supervision of P. Z. Caverhill, provincial forester, subject to the general direction of the Minister of Lands and Forests. The size and importance of the undertaking is indicated by the fact that the Crown lands in this province comprise 10,000 square miles and return a direct revenue to the provincial treasury averaging more than half a million dollars annually from timber alone, in addition to large revenues from the sale of hunting and fishing privileges.

C. H. Morse, Assistant Inspector of Forestry Branch at Alberta, enlisted with the Foresters' Battalion and up to the time of this writing he states that his company had not got down to the actual work for which the battalion was formed. One of the best

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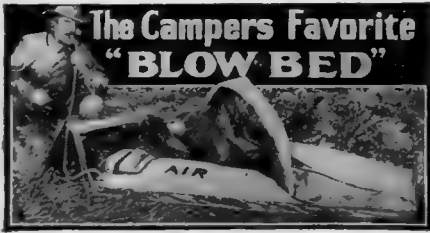
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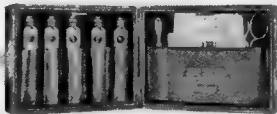


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Alberta rangers, J. A. Hutchison, of the Brazeau Forest staff, is also leaving, and it is his intention to join the aviation service. Forest Assistant Macdonald of the Bow River has also completed his Officer's Training Course, although up to the present time he has not yet been assigned to a battalion.

Aside from the above changes there has been little change in the personnel arrangements at the Alberta branch, with the exception that Mr. R. C. St. Clair, formerly with the C. P. R. Forestry Branch, has been employed by the Branch and is assigned as Forest Assistant on the Crowsnest Forest. Forest Assistant Manning, who, up until this spring, was on the Clearwater Forest, has been transferred to the Alberta office at Calgary and will conduct special lines of work essentially in connection with timber sale and timber permit administration.

Fire-fighting Combination

A new fire-fighting tool has been invented by a forest ranger in California which consists of an interchangeable hoe and rake. It is said to be the best tool of the sort yet devised.

Osage Orange for Dyes

The use of Osage orange for making dyes promises to be extensive. The Forest Products Laboratory is making a census which shows that the supply of the wood is more than ample to meet present needs.

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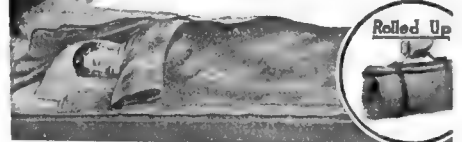
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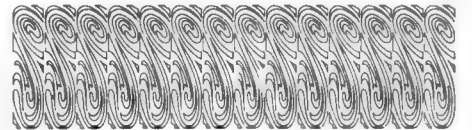
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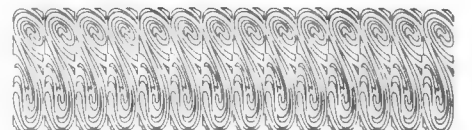


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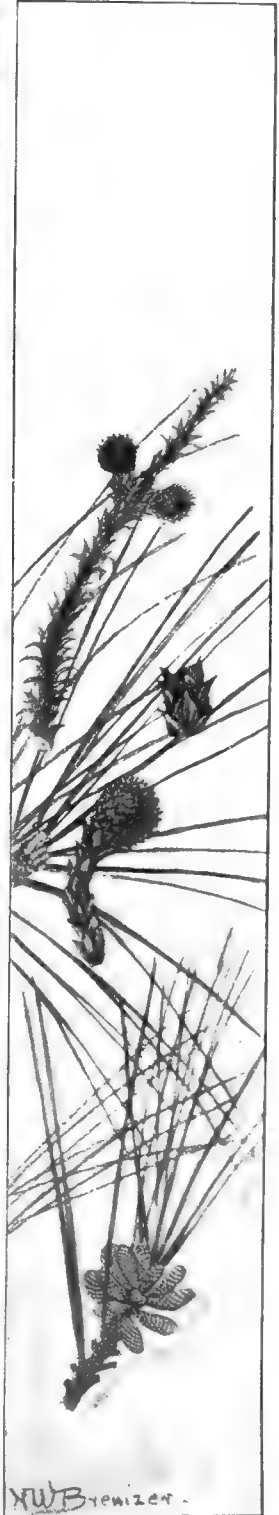
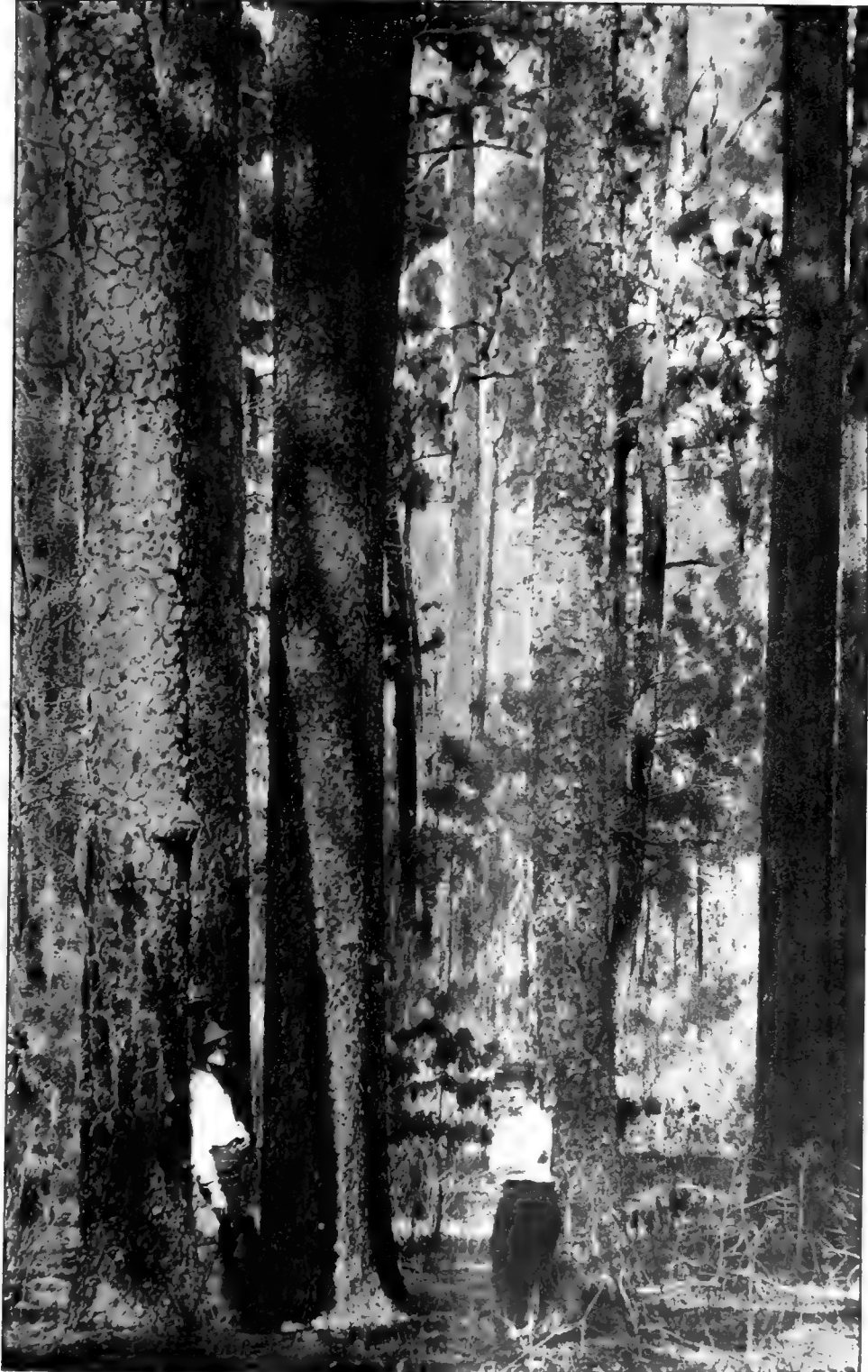
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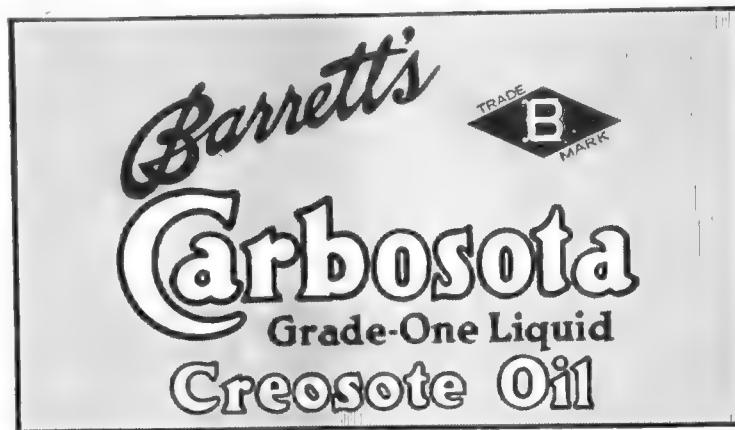


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AMERICAN FORESTRY

The Magazine of the American Forestry Association

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SEPTEMBER 1916. VOL. 22

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Shortleaf Pine

Identification and Characteristics

BY SAMUEL B. DETWILER

THE pine forests of the southern United States long have furnished more lumber under the name of Southern Yellow Pine than any other closely related group of timber trees in this country. Shortleaf pine (*Pinus echinata*) produces more than one-fifth of the lumber derived from the five southern "Yellow Pines" and promises to be even more prominent in the future when systematic forest management in the United States is more fully developed.

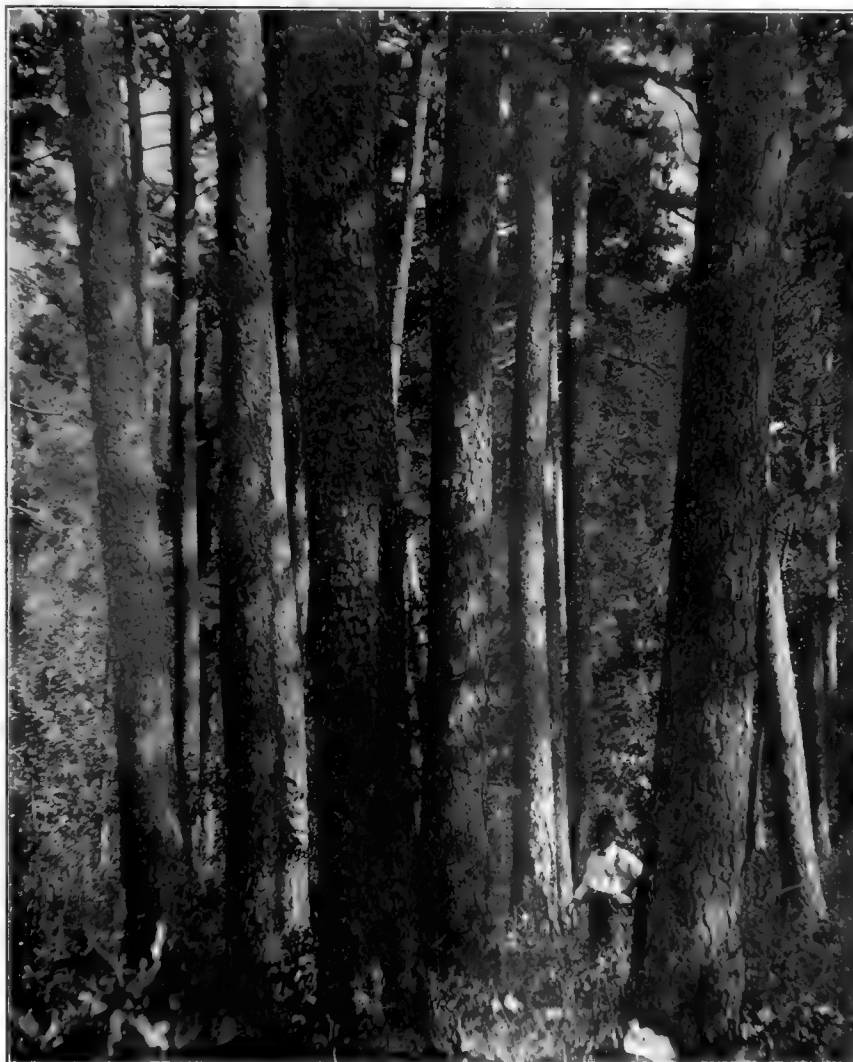
Shortleaf pine is found in a territory covering more than 440,000 square miles and is commercially important in an area of about two-thirds this size. Its region of natural growth extends from southeastern New York through the southern limits of Pennsylvania, Ohio, Indiana, Illinois, Missouri, and southward to eastern Texas and northern Florida. No other American pine is so widely distributed. It makes its best growth at elevations of 400 to 1500 feet, but extends from sea level to an altitude of 3000 feet in the Southern Appalachian Mountains.

Shortleaf pine grows to moderate proportions for a member of the pine family, rarely at-

taining 4 feet in diameter and 130 feet in height. The ordinary size of mature trees is 2 or 3 feet across the stump, with a total height of 80 to 100 feet. Because this species can grow rapidly in height when young trees are crowded together in dense forests, trees in the woods have long, clean, straight trunks that taper slightly until they branch into small, rounded or somewhat pointed tops. The exceptionally clear, straight trunks furnish the quality of logs most desired by lumbermen.

Trees growing in the open have branches low on the trunk, forming a conical crown. The lower branches droop slightly and are seldom more than 20 or 25 feet long. The straight, gently tapering trunk and narrow, compact, well-proportioned head enable the trained eye to distinguish from a distance the shortleaf pine from the broader topped loblolly and longleaf pines.

Recent scientific studies have shown that up to fifteen years of age the tops of shortleaf pines in dense stands have an outward growth of one foot for each inch in diameter growth of the trunk at breast height. In later life the increase in the spread of the



TYPICAL STAND OF SHORTLEAF PINE

This photograph, published by courtesy of the Southern Soft Pine Bureau, shows a first-class stand of shortleaf, the size of the trees being indicated by comparison with the man standing by one on the right.

branches varies from 17 to 21 inches for each inch of diameter, according to the region in which the trees grow. Knowledge of this law of growth is used by the forester in determining the number of trees per acre required to produce the highest profits in a well-managed forest.

The light brown bark of old trees is rather thick and is broken into squarish plates which are covered with thin, cinnamon-red scales that peel off easily. Young twigs have smooth, violet-colored bark; twigs of shortleaf pine differ from those of other pines with which it grows in being brittle and easily snapped off. Until maturity, loblolly pines have somewhat thicker and darker colored bark than the shortleaf, and the furrows are deeper.

A large number of misleading local names embarrasses the shortleaf pine. In fifteen states, from New York to Louisiana, it is often called Yellow pine. In some of these states it is called Spruce pine, Bull pine, Pitch pine, Poor pine, Rosemary pine, Slash pine or Old Field pine. Another name that is much used, especially for the lumber, is North Carolina pine, or North Carolina Yellow pine.

Shortleaf pine, the name that fits it best and is most used, is derived from its short, slender leaves. The soft, flexible needles are 3 to 5 inches long and are short only in comparison with those of the longleaf pine, which are three times this length. As a rule two needles are found enclosed at the base by a short persistent sheath but occasionally there may be three, or rarely even four leaves in a bundle. The foliage varies in color, according to locality, from deep blue-green to pale green.

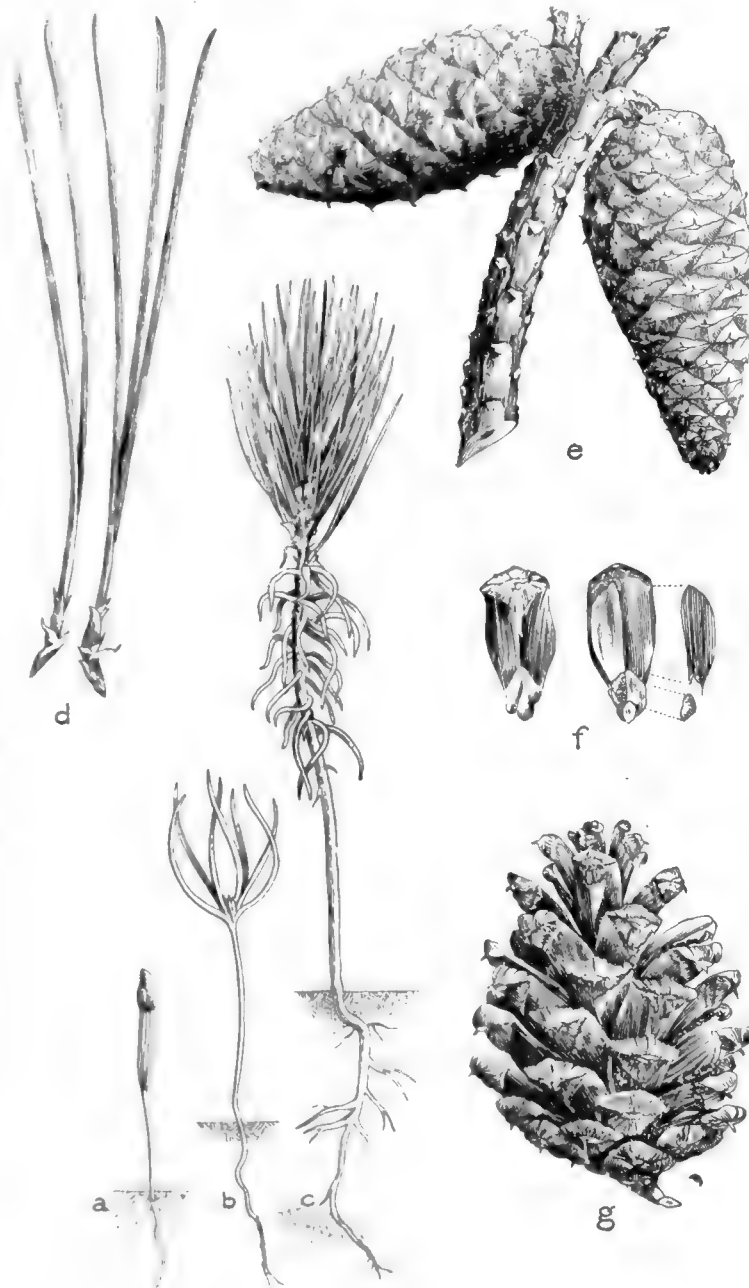
The flower buds appear on shortleaf pine during the latter part of the winter, opening in March in the far South, and in April or May in its northern limits. Dense clusters of pollen-producing flowers, about an

inch long, are borne at the tips of the twigs. Each flower is a pale purple cylinder of numerous overlapping pollen sacs and surrounded at the base with 8 or 9 small scales. These flowers drop from the tree as soon as the pollen has been discharged. One to four cone-forming flowers are produced just below the tips of the young shoots. They are oblong bodies about one-fourth of an inch in length composed of numerous overlapping pointed scales of a delicate rose-pink color. The cones develop slowly, the seed ripening only after two seasons' growth.

The mature cones are attached very close to the branch and have a leathery brown color. They are 1½ to 2½ inches long and nearly as wide when open. Each scale has a thickened four-angled tip which is smooth, or armed

with a weak, curved prickle. The cone opens early in the autumn to discharge the small triangular seeds which are all shed by December, although the old cones may continue to hang on the branches two or three years longer. A relatively large wing about half an inch in length is attached to one end of the seed and enables a strong wind to carry the seed from one-eighth to one-fourth of a mile. A light breeze will waft the seeds a distance equal to two to five times the height of the mother tree. A pound of clean seed contains from 50,000 to 70,000 separate seeds and ordinarily germinates sufficiently well to produce from 25,000 to 40,000 seedlings. The seed retains its vitality well for several years when properly stored.

Shortleaf pine has a pronounced tap root and strong side roots; for this reason the trees are not easily thrown by the wind. The long tap root enables it to grow thriftily in soils not well supplied with moisture, such as dry sands or high ridges. One instance is noted in which an eight-year-old short-



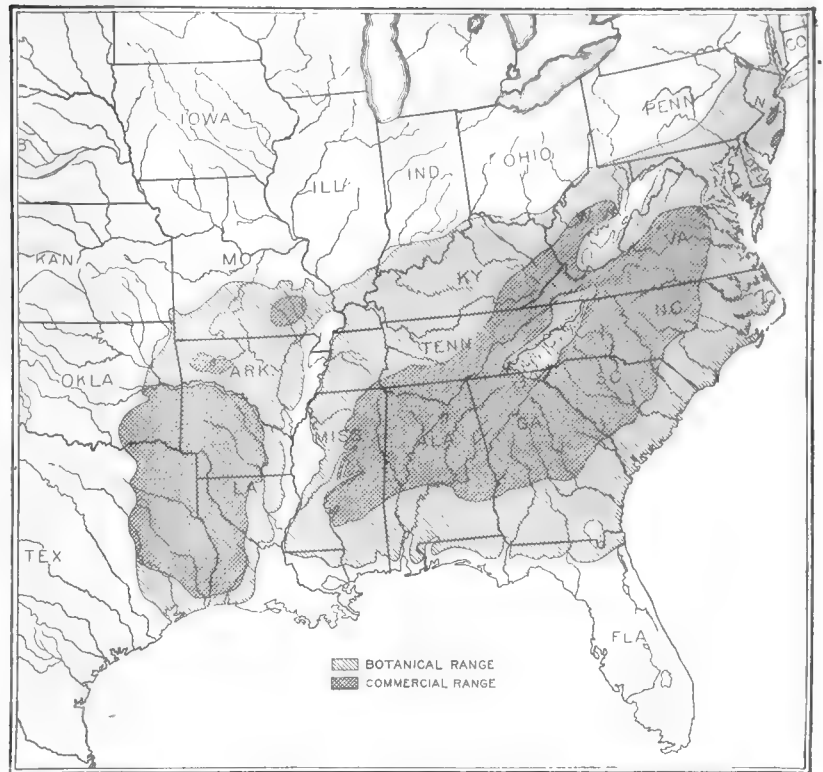
SHORTLEAF PINE LEAVES, SEED, CONE AND SEEDLING

- a Young seedling.
- b Same seedling after one month's growth.
- c Same seedling at end of first season showing early bundles of true leaves.
- d Two-leaf and three-leaf clusters.
- e Branch with mature closed cones or burrs.
- f Cone scale and seed with wing detached.
- g Mature cone opened.

leaf sapling had a tap root reaching to a depth of 14 feet. Only a very few coniferous trees have the power to send up vigorous shoots from their stumps when the trees have been felled or the tops have been killed by fire, but shortleaf pine possesses this valuable means of reproducing itself during the early years of its life.

A cross-section of a log of shortleaf pine shows a broad band of nearly white sapwood surrounding the pale, reddish brown or orange-colored heartwood. The wood is straight-grained and varies considerably in resin content and hardness, but is stiff, strong and moderately heavy. The well-defined rings of annual growth consist of a band of light-colored soft wood surrounded by a darker band of denser, harder and more resinous wood. These bands in the annual ring are known respectively as the spring wood and the summer wood.

Forests composed entirely of shortleaf pine are found, but stands of pure growth usually are of small extent, surrounded by areas of shortleaf mixed with other pines or hardwoods. Pitch pine and scrub pine share



RANGE OF SHORTLEAF PINE

The heavily shaded portion of the map shows the commercial range of this famous and much-used wood, while the lightly shaded portion indicates the botanical range.



BARK OF SHORTLEAF PINE

a considerable portion of its territory in the north, and loblolly pine grows practically throughout the range of shortleaf on the heavier and more moist soils. Longleaf pine and three other southern pines grow with it in the South, and in the Appalachian Mountains it meets white pine and table mountain pine. Many kinds of oaks and hickories are frequent companions of the shortleaf pine, together with less important broad-leaf trees such as persimmon, sassafras and dogwood.

Shortleaf pine grows well on many kinds of soils, ranging from sand and gravel to stiff clays. Unlike loblolly pine,

which prefers low-lying land, it always selects the better drained sites. The vigor of the tree is shown by the wide variations in temperature it can endure; it withstands temperatures of 22° F. below zero in New York and New Jersey, and grows equally well in Louisiana, where the thermometer may register 112° F.

Shortleaf grows more rapidly than longleaf pine and more slowly than loblolly pine. Studies made by the Forest Service in stands of fully stocked second-growth shortleaf pine in North Carolina indicate that this tree in 80 years under the best conditions will yield in excess of 40,000 board feet (Scribner rule) per acre. On medium soils the growth in the same period will approximate 33,000 feet, board measure, per acre, and on poor soil in 80 years the yield is only about 24,000 feet. In stands 20 years old the lumber production was found to vary from 5700 board feet per acre on good soils to 700 board feet on poor soils.

Shortleaf pine in the forest may live to be 400 years of age, but its average life is not more than 200 to 300 years. To produce a mature stand of saw timber from shortleaf pine requires 80 to 100 years, depending on the quality of the soil. For tie production or cordwood the maximum growth occurs between the ages of 60 and 80 years. With proper thinning the rate of growth is considerably hastened.

The first thinning in well-stocked shortleaf pine forests should be made when the trees are 20 or 30 years old. Under average conditions, about one-third of the trees should be cut out in this early thinning; older stands should be treated less severely. Small, weak trees, struggling hopelessly below the tops of the majority of trees,

are of no benefit, and if left they may feed a forest fire that will cause severe injuries to the better trees. In addition to the sickly trees, some of those with smaller crowns that have not quite reached the general level of the stand should be removed to give the adjoining trees room to spread their tops a little further in the sunlight. Occasionally there will be found a tree which is much taller

and larger than surrounding trees and rapidly overtopping them; by cutting these greedy individuals the thinning is made to yield more valuable material and the conditions of growth for the remaining trees are equalized. If the young forest is dense, it may be necessary to remove half or even two-thirds of the average-sized trees in order to give the remainder sufficient space for profitable growth. Before healthy trees are marked for cutting, the defective, crooked, forked or knotty trees and those which show fungus fruiting bodies or insect work should be taken out. If soil and climatic conditions favor the pine, it should be given preference over broad-leaf trees. The object to be borne in mind in marking the trees for thinning is to leave those that are

to continue growth as uniform in height and spacing as possible. In the absence of other trees over a larger space than two or more square rods, all classes of trees should be retained.

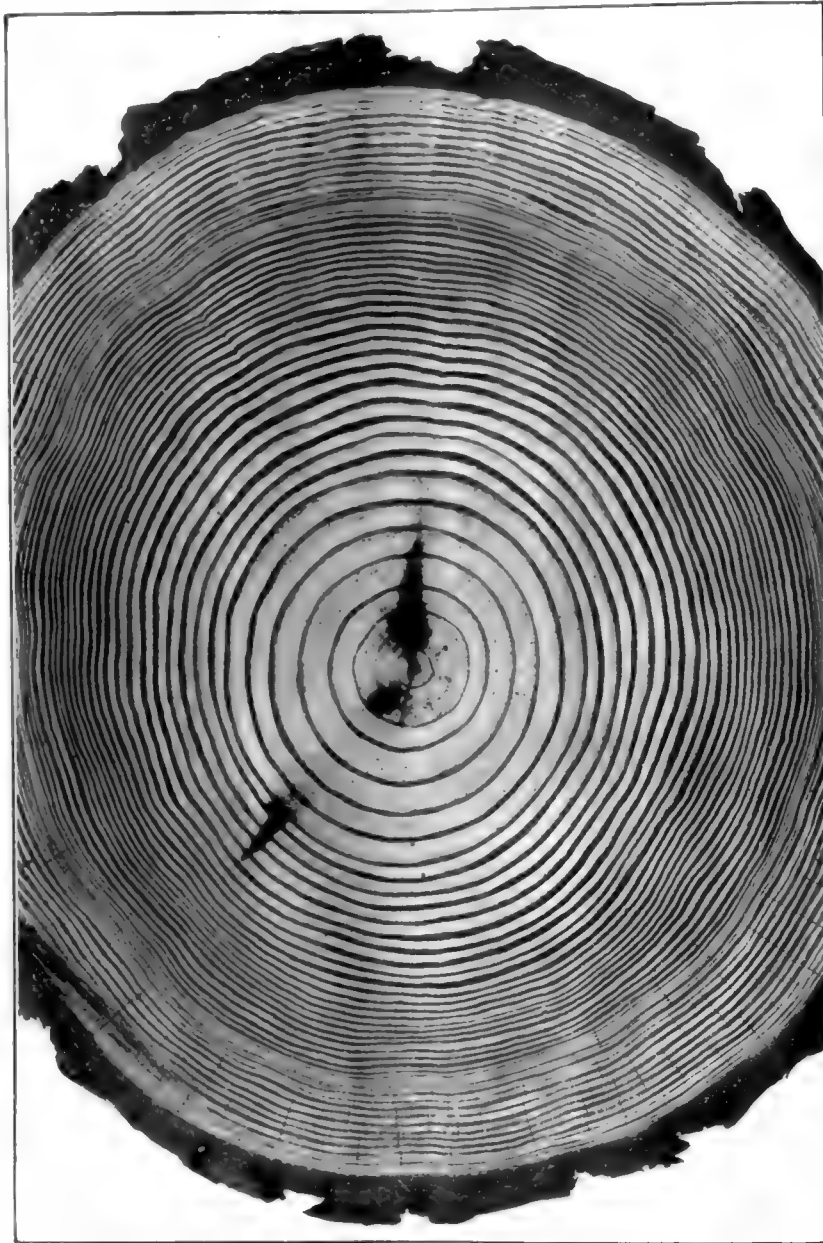
Millions of shortleaf, longleaf and loblolly pine trees in the South have been killed in recent years by the southern pine beetle. The loss caused by this insect is estimated to be more than \$10,000,000 for the past twenty-year period. A practical remedy is to convert the trunks of the infested trees into cordwood and use the wood for fuel before the beetles leave the bark, or to manufacture the

logs into lumber or other products and immediately burn the slabs of bark. A moth attacks and deforms the tips of vigorous young saplings, sometimes causing considerable injury for several successive years in some localities.

This tree is not subject to serious fungus enemies except such as attack the tree through wounds made by forest fires. Forest fires probably cause much greater financial

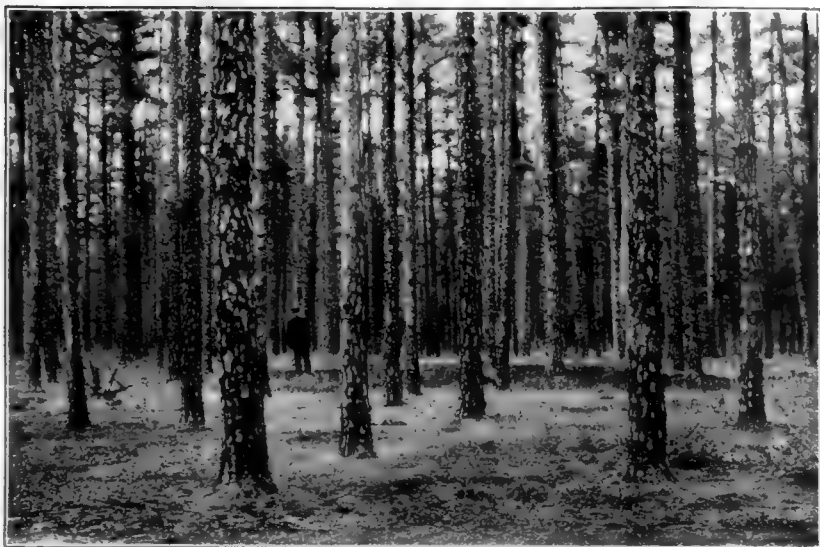
loss than any other enemy of shortleaf pine. Trees which are not killed outright are weakened and retarded in their growth. Young shortleaf pines are blessed with an ability to send forth vigorous sprouts up to the time they are 8 to 12 years of age, and for this reason they are able to recover from the effects of many fires which completely eliminate other kinds of young pines from the forest.

The principal value of shortleaf pine for planting lies in the establishment of commercial forest plantations. Its growth is so rapid and it adapts itself so well to the purposes of the forester that in years to come it is likely to be planted extensively. The seed may be sown directly, either broadcast or in seed spots, where the trees are to grow permanently. Direct planting of young



THE GROSS CHARACTER OF THE SHORTLEAF PINE IN CROSS-SECTION

trees gives more certain results and it is not a difficult matter to raise the seedlings in seed beds. For general planting they should be set out early in the spring, spaced 6 feet by 6 feet, when they are a year old and before the tap root is greatly developed. If the land is very weedy or soil conditions are unfavorable, two-year-old transplanted stock should be used. However, the present need in most instances is better care of existing native growth. Shortleaf pine produces seed abundantly from youth to old age. Trees growing in the open bear seed in 20 years. Cut-over lands or old fields near shortleaf pine seed trees are



SEVENTY-YEAR-OLD SHORTLEAF PINE STAND

This shows a scientifically thinned stand of shortleaf pine in New Jersey. All of the thinnings have been fully utilized and the stand is in a thriving condition.

quickly seeded, resulting in dense stands of young pines of approximately the same age and size. Frequently it is possible to encourage natural reforestation by leaving seed trees in lumbering operations and guarding against forest fires, thus securing fine young stands of shortleaf pine at less cost than by forest planting.

As an ornamental tree, shortleaf pine compares with the best of Yellow pines and merits greater consideration for this purpose than it has received up to the present time. Its dark green, soft, glossy leaves and narrow, compact, well-shaped crown give it marked beauty. The vigor and hardiness of its growth and its power to adapt itself to an unusually wide range of soil conditions are qualities that add greatly to its value for general planting.

Commercial Uses of Shortleaf Pine

THE most useful wood that grows in America is southern yellow pine, the wood of a thousand uses.

Not only is southern pine adapted to a greater variety of uses in building and manufacture than almost any other wood, but its by-products, aside from the most important purpose of making lumber, are remarkably varied in their nature and application. So intimately is yellow pine and its products associated with the daily life of humanity that very few persons conceive of the many ways in which it serves us. In city and country, day and night, whatever our occupation or condition in life, southern yellow pine is contributing something to our well being, literally "from the cradle to the grave."

Definitely restricted in the area of its growth, southern yellow pine's good qualities are so varied and its adaptability so superior that its distribution as lumber is limited only by the confines of civilization and the facilities for transportation.

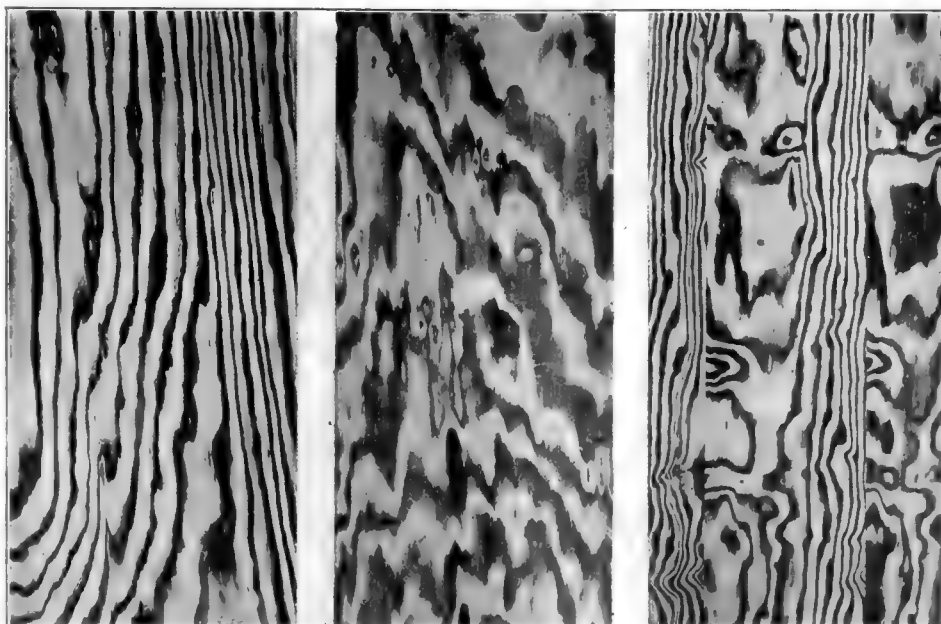
In America its place in manu-

factures and building construction is such that more than 39 per cent of all the lumber consumed is southern yellow pine, while enormous quantities go to Europe. Its annual production—more than 14,000,000,000 board feet—is over three times as great as any other one wood and equal to the combined production of the five other leading woods.

Shortleaf pine (*Pinus echinata*) is one of the important southern yellow pines. For over two centuries it has held a prominent position commercially. The principal supply of shortleaf pine lumber comes from Alabama, Arkansas, Georgia, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, eastern Oklahoma,

eastern Texas and Virginia. It is found in a dozen other states but in relatively smaller quantities than in the states named.

One of the best-known uses of shortleaf pine is for interior finish and trim. In general, shortleaf cuts from 30 to 35 per cent of clear stock. It is from the thick, clear sapwood that the highest grade of



VENEERED PANELS

Giving a hint of the varied and beautiful grain of the wood of southern yellow pine now being so much used for interior trim of houses.

interior finish is manufactured and it is practically free from resin, and beautifully marked; a strong, clear, bright, compact timber, soft in texture, readily smoothed and joined.

As a finishing wood there is absolutely no successful substitute for shortleaf pine and leading architects are specifying it and builders are using it more and more for the finest homes all over the country. It is pre-



SHORTLEAF OR SOUTHERN YELLOW PINE LOGS READY TO BE HAULED TO THE MILL

and permanently, but no effect of richness and beauty in color and tone is beyond the possibilities of the builder with this wood, and at a cost much less than that entailed in the employment of any other variety of anything like the same intrinsic merit. There is absolutely no color or tone effect in perfect, permanent interior finish that cannot be obtained with the use of high-grade shortleaf pine prop-



USING WASTE OF SHORTLEAF PINE

Lumber manufacturers are now giving more attention to the utilization of their mill waste. Here is an illustration

of the process; therefore it requires less labor and expensive hand scraping to obtain a smooth, satin-like surface. It is not only bright and attractive but it hardens with use, and its general beauty and utility are not surpassed by the most expensive hardwoods.

Shortleaf pine not only takes and holds paint perfectly

because of its more striking grain, soft and beautiful texture, which particularly adapts it for fine joinery. No other wood that grows offers such a wide range of choice in grain and figure. There is no sameness in the shortleaf figure; some of it is large and bold, some fairly uniform and much of it is delicately engraved.

Shortleaf pine does not "fuzz up" or show "knife marks" in the

erly treated. On account of its absorbing qualities and absence of pitch, it takes paint well and there is no discoloration caused by the boiling or oozing of the pitch through the pigment. The first coat of stain or lead and oil is absorbed to a nice degree of penetration. This wood is especially suited to use as a base for white enamel. The white surface will not be stained from underneath.

The absorption of the flat white coat is perfectly uniform and the fine texture of the wood prevents any trouble from raised grain. The enamel coats are very smooth and



USED FOR A DOOR

The curly effect of the southern yellow pine is shown to unusually good advantage in this photograph.

The fine texture of the wood prevents any trouble from raised grain. The enamel coats are very smooth and

the result is equal to that obtained on more costly woods.

Shortleaf pine grips the nail firmly. The fibers are straight and tough and the wood cuts readily and still will not split easily when nailed. This permits of making knife joints at all toe-nails and miters. It is used for outside trim—cornice, corner boards, outside base, window casing, siding, porch columns, flooring, and ceiling.

Shortleaf edge grain flooring is a "quarter-sawn" flooring, and is frequently called "rift sawn" or "comb grain." The cut is across the annual rings. It is especially desirable for all high-class floors in residences. A room of any width from eight to twenty feet may be laid in one length of flooring, eliminating joints and producing a floor of mirror-like smoothness. It is easily finished by any process, presents a splendid appearance, and gives excellent floor service. It has been specified for many years by conservative architects and contractors because by its use their results have been so uniformly satisfactory. Invariably they have recommended it to their clients for floors of large area, where strength, good service, smoothness and staying qualities are absolute requirements, and for high-class house-flooring where artistic appearance, good wearing qualities, cleanliness and sanitation are essential floor necessities.

Shortleaf pine laths are light to handle, easy to nail, and do not tend to split, since they are soft in texture and tough in fiber. They are practically free



A NOVEL VIEW OF SHORTLEAF PINE

A view from the ground upward to the tops of a group of shortleaf yellow pine showing the narrow crown and the straight clean bole which is typical of the species.

from pitch, wane and knots. Cabinet-makers often prefer shortleaf pine because it is more easily worked, has less resinous matter, and finishes well.

Most of us are familiar with the ordinary household uses of this wood—its use for furniture, house-building, farm construction, implement manufacture and repair, and cars and other vehicles in which we ride. Many of us know that it is among the most important of

woods used in ship-building and that it is extensively employed in the making of our play-outing goods and musical instruments. But in addition to these more or less well-known uses it has many others which the average person would never suspect.

Some of the uses of shortleaf are given in the following list:

- | | |
|--------------------------|------------------------|
| Agricultural implements. | Furniture backs. |
| Balusters. | Grill work. |
| Baseboards. | Hand rails. |
| Blinds. | Head blocks. |
| Boat construction. | Ice boxes. |
| Bottoms (vehicles). | Interior trim. |
| Boxes. | Kitchen cabinets. |
| Brackets. | Ladders. |
| Cabinet work. | Lawn swings. |
| Cabinets. | Mantels. |
| Car decking. | Moldings. |
| Car siding. | Newel posts. |
| Cases. | Panels (veneered). |
| Casing. | Partition. |
| Ceiling. | Pickets. |
| Clapboards. | Roofers. |
| Columns. | Sash. |
| Cores (veneer panels). | Screen doors. |
| Cornice. | Sideboards (built-in). |
| Crating. | Siding. |
| Display racks. | Silos. |
| Door frames. | Stairways. |
| Doors. | Tobacco cases. |
| Drill boxes. | Trunk boxes. |
| Excelsior. | Wagon panels. |
| Finish. | Wardrobes. |
| Fixtures. | Window frames. |
| Flooring. | |

Lumbermen are becoming thoroughly awake to the possibilities of the utilization of waste materials. Contemplating the diminishing timber supply and the greatly increased cost of production of building material, they are expending millions of dollars in research work devoted to finding uses for the "odds and ends" of wood formerly discarded without a thought of their possible utility.

What has already been accomplished along that line, especially in the great southern yellow pine forests, would amaze an "old time" lumberman out of touch in recent years with changing conditions. Research work in field and laboratory has developed so many new uses for lumber "culls" and waste materials that to-day the southern yellow pine interests, like the packing interests, come

pretty near utilizing "everything but the squeal."

Turpentine, rosin, excelsior, charcoal, and pine tar are important by-products, which are now being made in quantities from wood fragments formerly destroyed by fire. Pine oil, used in the manufacture of varnishes and paints, is a comparatively new product from waste, obtained by distillation. The mill scraps, shredded and subjected to chemical treatment, yield a pulp that is made into the strongest wrapping-paper known. Longleaf pine

has been used almost exclusively in the experiments and manufacture of natural color kraft pulps and papers, but the similarity of the wood of shortleaf and longleaf makes it probable that further experiments will show a like use for shortleaf. Uses have been found even for the pine needles, the "leaves" of the tree, which, distilled green, yield an oil of balsamic odor, while boiling the needles in a solution of alkali produces "pine wool," a fibrous substance that is carded into fabrics or used in upholstery.

Government statistics do not distinguish between longleaf and shortleaf in giving the annual consumption of southern yellow pine in the various manufacturing industries. However, shortleaf has a very important place in the industries here mentioned:

The manufacture of boxes and crates consumes 10 per cent of the total annual lumber output of all woods in the United States, and southern yellow pine provides the material for one-fourth of all such products.

In railway car construction the annual consumption of lumber is 1,260,000,000 board feet—and southern yellow pine supplies 54 per cent of it.

In the manufacture of agricultural implements—plows, harrows, cultivators, drills, planters, threshing machines, rakes, etc.—300 million feet of lumber are used annually, and over 30 per cent of it is southern yellow pine.

In ship and boat building 200 million feet of lumber are required every year—and 53 per cent of that is southern yellow pine.

In the manufacture of trunks and valises, which requires 75 million board feet of lumber annually, southern yellow pine supplies 20 per cent.

In the manufacture of playground equipment, 16 per cent of all the wood used is southern yellow pine, and in the making of scales and weighing apparatus 24 per cent of the wood required is that same species.

Of all the excelsior produced, necessitating the consumption of 100 million board feet of lumber annually, 15 per cent is southern yellow pine.

To obtain the maximum service from any wood, however used, it is necessary to know something of the individual qualities of that wood. The specialists and the technical experts inform themselves along this line as a matter of course—and are the gainers by their knowledge. No less surely will the general run of us be benefited by a little accurate information concerning the woods best suited to our uses. A careful study of the merits and qualities of shortleaf pine will prove conclusively that it is entitled to high



SHORTLEAF PINE FOR INTERIOR TRIM

All of the trim and panelling in this room are of the curly southern yellow pine, finished in natural color. Note the beautiful grain in the broad panels.

consideration as a structural and finishing wood.

THE Curse of the Forest," a motion picture of a real forest fire, showing methods of fighting and the devastation which follows in the wake of a forest fire, has just been completed by the Vitagraph Company of America in cooperation with the Pennsylvania Department of Forestry.

CALIFORNIA'S ever-threatening forest fires of the dry season hold a minimum of menace to the great tract of redwood trees, because the bark, several inches thick, is almost fireproof. The California redwood forests contain 80,000,000,000 board feet of lumber, and the trees have been standing since the beginning of the Christian era.

SEE SPECIAL OFFER TO MEMBERS UNDER
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WHERE ONCE THE TOWN OF MATHESON STOOD

This town was destroyed by wave after wave of flame, which swept across the almost flat country surrounding it, at a speed which caused total destruction of property and cost many lives. The photograph, taken from the window of a relief train, gives only a general impression of the havoc wrought by the fire. The air was thick with smoke and the fire still burned fiercely in piles of fallen trees when the photograph was taken.

Canada's Deadly Forest Fires

BY ROBSON BLACK

Secretary, The Canadian Forestry Association, Ottawa

THE most disastrous forest fire in the history of Canada broke across the "Clay Belt" region of Northern Ontario on the afternoon of Saturday, July 29th. Within eighteen hours, more than 200 lives were forfeited, 1200 square miles of bush and clearing devastated, and the thriving towns of Cochrane, Porquis Junction, Iroquois Falls, Nushka, Kelso, Matheson and Ramore badly damaged or swept wholly from sight. What the loss means in terms of dollars is vaguely stated as between three and six millions, exclusive of forest damage. Hundreds of settlers' homes, their standing and harvested crops of hay, barley, oats, wheat, and potatoes, with much live stock, farm implements and the hard-won accumulation of years, were turned to drifting ashes and chunks of charcoal. The Temiskaming and Northern Ontario Railway lost one hundred freight cars, on some of which the steel wheels were melted by the sulphur cargo to shapeless pools. Railway stations in the heart of the fire were reduced to twisted skeletons, and mining companies lost every structure above the earth's level.

Had a hail of high explosive been let loose upon the

bush lands from Matheson to Cochrane, the suddenness and violence of the catastrophe could not have been more terrifying. Drifting smoke of Thursday and Friday, rousing few apprehensions in a country accustomed to clearing fires, became by Saturday afternoon a smothering blanket of flame and gas and flying debris. Fierce winds drove the fire and smoke with such speed that only a broad river or lake, or an uncommonly wide clearing, was of much avail. Blazing pine tops hurled through the air, and where a home well separated from the bush seemed one moment in perfect safety, in the next it crackled with flames. Settlers and prospectors hastened toward the villages. Some reached their goal. Scores of others were smothered as they ran. Bodies were found lying across tree stumps; some held empty pails, some grovelled into the earth. One man took to a swamp before an advancing cloud of fire, while his comrade remained on a cliff. The cloud dipped into the swamp, consuming the body of the first fugitive, and swept over the head of the man on the cliff, leaving him quite unharmed. Veering winds accounted for surprising incidents, as when a house and its human contents would

be destroyed, while a hay rick a hundred yards distant would be spared. Settlers and their families, with homes bordering the rivers, took to canoes, upset them, and by

to the speed of the fire in this manner: "I had been fighting bush fires all day and returned for supper. At that time the smoke was curling about the far buildings,



THE RUINS OF FIRE-SWEPT MATHESON

Another view of the fire-swept area at the unfortunate town. All around this town the fire has destroyed the timber to such an extent that there is none left for fuel, and this must now be transported for many miles.

piling wet blankets atop existed in such precarious shelter for hours. Two families, numbering fourteen persons, clambered into a well. The adults tore their clothes to strips and by stuffing the children's mouths with moistened pieces and covering their heads in a similar manner came through the night of Saturday free from injury. Fifty-four men, women and children, mostly French-Canadians, at Nushka, where the worst fire seems to have originated, raced frantically for a shallow cut in the railway; every one was smothered by heat and gases. Under culverts and in wells and mine shafts families were found burned to death; a tragic number of babies appears in the list of victims, and a further pitiful legacy is the large group of wounded now recuperating in hospitals and homes.

Evidence of the cause of the fire points directly to settlers' slash burnings which, week after week, were allowed to work their way into nearby bush, encouraged by the peculiar peaty character of "Clay Belt" soil. Lacking the supervision or control of fire rangers, for Ontario has no law restricting the settler, the intensely hot period of July brought along the logical penalty. Numbers of small fires joined forces and, whisked into action by the Saturday hurricane, turned township after township into a fury. Said one survivor: "The roar of the thing was awful. You could hear no person speak for the noise. Flames climbed up at times two hundred feet above the bush. I noticed little excitement, and most people appeared to be waiting unafraid. All the while the gale was increasing." Another settler gave emphasis

but the actual conflagration was a mile away. My wife prepared the meal, a matter of a few minutes. Then she went to the front door and looked out. At once she returned, shouting that the fire was upon us. We had time just to reach the potato patch where we flung ourselves down and managed to find a thin layer of air close to the earth. The green vegetation seemed to hold up the smoke clouds, and after hours of terrified waiting we came through the ordeal without serious hurt. Every vestige of our home and stables was changed to charcoal." It is noteworthy that clearings of a quarter-mile about some of the towns were crossed by the fire, not alone by flying sparks, but by the blazing grass and stubble.

From the first violent action of the flames at Nushka on Saturday afternoon and evening, the swath of destruction took fresh bearings north and south. Cochrane, which stands at the junction of the National Transcontinental and the Temiskaming and Northern Ontario railways, with a population of 2500, was enveloped by fires originating in its immediate district, the business section being destroyed, with an estimated loss of \$1,000,000. Matheson, the axis of a more southerly fire, was clean-swept, with the exception of three small houses on a hillock. To its grave-yard were brought the bodies of 135 persons from Nushka and the neighboring farming districts. The population of the town proper took to the clearings and came through safely with the aid of a freight train which, by good luck, had been stalled on its southerly trip by a burned bridge.

Beyond the limits of towns and villages, the picture



AFTER THE FIRE AT COCHRANE

Chief J. A. Crawford, of Cochrane police, and a couple of business men talking over the reconstruction of the town. Water-tank and the first new buildings appear in this photograph, for with typical enterprise the survivors began to rebuild long before the ashes of the fire cooled and just as soon as building materials could be rushed to the place.

before the writer's eyes was of a charred and lifeless expanse, the smoking ruins of homes, the stripped tree trunks, isolated heaps of pulpwood, and endless miles of forest debris. For great distances about Matheson, the land looks as flat as a prairie, and the process of slash clearing has undoubtedly been facilitated. Indeed, the clearing has been so thorough that one wonders where fuel wood and fence posts and small lumber will be secured in future, and what prices will be paid. In other districts, the fire's effect has been to reduce the slashings and loosen the roots, while merely killing the green bush

and exposing the district to a vastly greater disaster in future years of drought.

The refugees looked upon such scenes and such prospects with remarkable stoicism. Men and women and frightened groups of children gathered about the station platforms, wearing garments from the Government relief train and munching from boxes of emergency food, waiting solemnly for the next turn in the terrible drive of events. Sometimes whole families found themselves united, but the rule of the day was of broken households.

While the fires swept through every ounce of kindling



Photograph by British and Colonial Press, Toronto.

ARRIVAL OF THE RELIEF TRAIN AT MATHESON

Only the stone walls of the station remain standing. Fortunately the railroad was not destroyed and it was possible for relief trains to take supplies to the destitute, and physicians and nurses for the injured survivors.

that stood in the road, relief measures were under way. With appropriate vigor, a train-load of provisions and equipment was sent from North Bay on Sunday morning and every town beyond the devastated area hurried motor cars with doctors and nurses to render service.

By such means the hopelessness of the situation was a good deal relieved. Private and governmental agencies carried in food and clothing, and burying parties removed the scores of coffins collected about the railway tracks and roads. Light rains, commencing Sunday morning, spread across the blackened country and, increasing in volume, gave the people their first hint of cheer. Hundreds had, of necessity, taken train for Southern Ontario; others were in hospitals of the railway towns beyond the danger zone, and a luckless remnant located themselves in the temporary villages of tents until the way should open for a fresh start at farming.

Government aid was immediately assured to the extent of partial rehabilitation of the sufferers, special agents were appointed, and provision made for housing and food supplies. To advise the Government regarding a permanent policy on all matters connected with the restoration of working conditions, a business committee was convened by the Minister of Lands and Forests and will investigate and report.

Such is the general outline of a catastrophe burdened with the most terrible and poignant incidents and relieved,

too, by plentiful tales of heroism. It was the second severe fire within five years in the same part of Ontario. The penalty of the Porcupine fire of 1911 was 84 lives and covered an area very much less than that of the 1916 disaster. In neither case was the forest growth of large size or maximum value, although the future will be in a better position to estimate exactly what the sacrifice of forest growth amounted to. The service rendered in the clearance of agricultural lands (where a slash had already been made) is naturally looked upon as a godsend. No

minimizing of the fearful toll of life, however, is possible and Northern Ontario regards its latest experience as too overwhelming to be weighed against real or pretended "benefits."

The "Clay Belt" fire of July, 1916, will rank as one of the greatest forest disasters in American history. The Hinkley



Photograph by British and Colonial Press, Toronto.

ANOTHER SCENE WHICH WITNESSED TRAGEDY

View from Nushka showing cut up the track where 54 people lost their lives. Only four people escaped from this town. Of those who took refuge in the narrow cut everyone was smothered by the heat and the gases from the fire.

fire in Minnesota, 1894, was responsible for 418 lives and the burning over of 160,000 acres. The famous Peshtigo fire in Wisconsin, 1871, killed 1500 and devastated 1,200,000 acres. In 1825 occurred the Miramichi fire in New Brunswick and Maine, with a loss of 160 lives and damage of 3,000,000 acres. The Clay Belt fire in Ontario, in point of lives lost, ranks third in the records of the continent, although the sacrifice of merchantable timber (under present conditions and present market values) is by no means a noteworthy distinction.

The Cause of the Fire—And Future Prevention

BY CLYDE LEAVITT

Forester, Commission of Conservation of Canada

THE terrible loss of life, and of property as well, in the recent forest fires in Northern Ontario, must cause thinking people to take stock of the situation,—to try to understand how such a thing could happen, and to determine what measures must be taken to prevent a recurrence.

The explanation of the disaster is, to a certain extent, to be found in the character of the country itself. In the autumn of 1912 Dr. Fernow made a brief investigation,

for the Commission of Conservation, of forest conditions along the National Transcontinental Railway for a distance of about 200 miles east and west of Cochrane, as well as south from this point, along the Temiskaming and Northern Ontario Railway. Dr. Fernow discusses, therefore, in his report, the situation in the very section devastated by the recent fires. He reported that much of the country is more or less swampy, due to the underlying stiff clay. As might be expected from this, the

character of the timber is, to a considerable extent, disappointing from a commercial point of view. Probably 60 to 70 per cent of the trees are black spruce, 10 to 15 per cent white spruce, 15 to 20 per cent aspen poplar and balm of Gilead, and 5 per cent miscellaneous species, mostly cedar, paper birch and jack pine. Hardly 10 to

causing the loss of not less than 84 lives. Numerous other fires had occurred, both before and since, so that there were large areas of fire-killed timber, as well as of clearing slash, ready to hand, constituting the worst kind of a fire trap. To a certain extent, therefore, the recent disaster is the result of secondary fires. Previous ex-



Photograph by British and Colonial Press, Toronto.

THE TEMPORARY MORGUE AT MATHESON

These two tents were erected at Matheson for the reception of bodies brought in from the surrounding district. The soldiers shown are members of the 228th Northern Fusiliers, who are searching for bodies and otherwise assisting with relief work. A number of coffins are shown, some empty and some containing charred remains. The work of rescue and relief was quickly organized and admirably conducted.

15 per cent of the forest contains material of saw-timber size; from 35 to 50 per cent contains material suitable only for pulpwood or fuel; from 35 to 45 per cent of the area is either muskeg, near muskeg, or scrubwood of a size hardly fit for fuel. The soil, when cleared, is for the most part excellent for farming. Drainage is, of course, necessary in the case of swampy areas. Considerable settlement has already taken place, and the region is destined to become an excellent agricultural section.

At the time of Dr. Fernow's visit, fires had been pretty well kept out of the country along the Transcontinental, but only the year previous (1911), the terrible Porcupine fire had swept over a large stretch of country around Porcupine, and south and east from that place, destroying the timber on hundreds of square miles and

perience in Michigan, Wisconsin, Minnesota, and many other parts of the country, shows that such fires are more serious than fires in green timber. This is due to the fact that the first fire does not consume the green timber entirely, but sweeps through the tops, perhaps burning out the roots as well, killing all growth and leaving it to become exceedingly inflammable and to constitute food for a second or succeeding conflagration. It usually requires not less than three or four successive fires to completely clean up an area of standing timber. While the recent fire has furnished the finishing touch over considerable scattered areas, large amounts of highly inflammable material still exist over the great majority of the recent burn. There will still, therefore, be great danger of serious fires in the region swept by the

recent one, unless adequate preventive measures are taken.

One of the inducements held out to prospective settlers in the Clay Belt of Northern Ontario has been the opportunity to make good wages by cutting and marketing pulpwood, thus making the operation of clearing the land pay for itself. While this argument has been justified in cases where the class of timber is favorable, and where the haul to the railway or drivable stream is not too long, there are other cases where the conditions are less favorable. In such cases, many of the settlers have shown an inclination to regard the timber on land desired for cultivation as a liability instead of an asset.

This condition has led, perhaps naturally, to the feeling on the part of many that fires would be a blessing, since they would hasten the day when large areas of agricultural land could be placed under the plow. Also, many prospectors consider fires a distinct advantage, since they lay bare the mineral soil, and thus facilitate the discovery of valuable minerals. Whether rightly or wrongly, the Porcupine fire of 1911 was attributed, at least in part, to fires started by prospectors with this object in view. This attitude on the part of a proportion of the resident population, particularly the settlers, would naturally make it difficult for a government to take adequate steps for the prevention and control of forest fires in that section. It goes, of course, without saying, that no one really contemplated such a holocaust as that which has just occurred. As long, however, as no lives were lost or large amounts of improved property destroyed, it is probably safe to state that a considerable proportion of the population of the Clay Belt regarded the occurrence of forest fires with a good deal of equanimity. No particular attention was paid to smouldering bush fires, which were

started in large numbers for the purpose of clearing land at any time the settler might choose. There is no adequate provision for the regulation or control of such fires in the Clay Belt, and real attention to their extinguishment has been largely lacking until such action has been rendered almost or quite too late by the occurrence of a prolonged hot, dry spell, such as took place during the last half of July. Only the occurrence of heavy rains

prevented the fires from assuming the proportions of a much greater calamity than actually took place.

It must not be understood that Ontario is giving no attention to the matter of forest-fire protection. On the contrary, a large amount of money is being spent annually on this work. The system has, however, a number of vital weaknesses.

The Dominion Forestry Branch estimates that Ontario has 70 million acres of land capable of yielding merchantable timber, or one-half

the total area of the province. Of this, about 13 million acres are included in provincial parks and forest reserves, and about 10 million acres are under license to cut timber under specified conditions, the land itself remaining the property of the Crown. Some of the timber limits being within forest reserves or parks, it is safe to estimate that there are something like 50 million acres of unlicensed Crown timber land not included in parks or reserves, and exclusive of non-productive areas. There is very little timber land in private ownership in the province of Ontario.

The annual revenue which the province receives from timber licenses amounts to upwards of \$1,500,000 annually. The holders of timber licenses are required to provide and pay the necessary staff of fire rangers on licensed lands, subject to supervision by the provincial authorities. Protection on other Crown lands is to be



Photograph by British and Colonial Press, Toronto.

A TYPICAL GROUP OF REFUGEES WAITING ON THE PLATFORM AT ENGLEHART
(Note Women and Small Family)

Many of these not only lost all their property but a number mourn the loss of relatives and several of them escaped by seeming miracles.

furnished direct by the Government, where such protection is considered worth while. As a rule, of the unlicensed and unreserved Crown lands, it has been considered practicable to provide fire protection on only those portions which contain quantities of white and red pine. Thus, there are large areas of land containing a poorer quality or quantity of timber which are left practically or altogether without protection. The area of such lands is so great that the Provincial Government has not felt justified in incurring the large additional expenditure that would be involved by the establishment of a patrol system.

The report of the Department of Lands and Forests of Ontario for 1915 shows that about \$300,000 was spent on forest protection in the province during that year, of which

apparently about \$230,000 was expended by the Provincial Government. The cost of fire-ranging on licensed lands was approximately \$70,000,—286 men being provided for this work by licensees. The total cost to the province for patrol of forest reserves was \$67,313,—166 men being assigned. On unlicensed Crown lands, 107 men were appointed, costing \$54,925. For the patrol of the National Transcontinental and Temiskaming and Northern Ontario Railways (owned by the Dominion and Provincial Governments respectively), 126 men were provided by the province, costing \$56,326. There were 18 chief rangers, 5 deputy chief rangers, and 8 supervisors on lands under license. In addition, 12 railway inspectors were provided to enforce the provisions of the Railway Act and the fire regulations of the Railway Commission as to privately owned railways. The cost of patrols in the parks is not stated, nor are figures available showing the total amount expended for extra labor in extinguishing fires. The privately owned railways are required by the Railway Commission to take full precautions with regard to the reporting and extinguishing of their own fires, and they are, as a rule, performing this work in an admirable manner, and help as well in controlling many fires from the

outside. The cost of this work does not appear in the figures above quoted.

It will thus be seen that a great deal of money is being spent on fire protection in Ontario. Why, then, is it possible for such a catastrophe to occur as has just devastated so large a section of Northern Ontario? The answer will be found in the discussion of the following points, which have been emphasized time and again in representations made to the Provincial Government by the Commission of Conservation and the Canadian Forestry Association.

1. There is no definite policy for the clearing of land in the north country, preliminary to settlement. Clearing is left entirely to individual initiative, supplemented by accidental fires. There is no regulation of



ONE OF THE MANY SAD SCENES

Unloading coffins of victims of the fire at Ramore. At each station along the fire-swept district, dead and injured from the surrounding country were gathered as quickly as possible by volunteer relief parties.

settlers' slash-burning operations, and it is usually the careless settler who naturally selects the driest time to burn. It should be noted that reports indicate settlers' fires as the agency responsible for the recent holocaust. It has been suggested that the province should adopt some general scheme of at least partial clearing, ahead of settlement. The clearing, by the government, of a strip extending back some distance from each road allowance, would enable the settler to make an immediate start in raising a crop, and would at the same time break the forest up into blocks, thus greatly increasing the chance of controlling fires. The difficulty of this will of course be the cost which the prospective settler would be required to repay in the course of time. It is believed, however, that this need not be prohibitive. In any event, in the light of past and recent experience, it would appear that the province should make a complete study of the whole situation and determine definitely and finally what areas are chiefly valuable for agriculture and which are chiefly valuable for continued timber production. As to the former, some definite policy should be adopted for the removal of the timber that will have due regard to the safety of life and property. As to the latter, adequate

fire protection must be provided, in order to assure a sufficient supply of timber for local needs, permanently. Also, beyond any question, an act should be passed prohibiting the setting out of clearing fires during the fire season, except on permit signed by an authorized forest officer. This plan is now in effect in British Columbia, Quebec, Nova Scotia, to a limited extent in New Brunswick, and also in the Dominion forest reserves. Similar provisions exist in a number of the states. It has proved conclusively that the extreme danger resulting from the unregulated burning of settlers' slash can be kept within reasonable bounds. There is no reason why a similar requirement should not be made effective in Ontario. A strong campaign to this end is now being waged, particularly by the Canadian Forestry Association. Many boards of trade are taking the matter up in a vigorous way and all this agitation must have an effect. It is to be noted that, for instance, Minnesota did not provide really adequate forest fire protection until after the disastrous experiences of the Chisholm and Baudette fires. It is to be anticipated that history will repeat itself in Ontario as well. The warning of the Porcupine fire of 1911 was not heeded, but adequate action is now imperative, unless the development of the Clay Belt is to be retarded indefinitely, on account of the unwillingness of present and prospective settlers to face the unnecessary hazard, by fire, to life and property.

2. The whole fire-protection service of the province should be reorganized, and extended to cover vast areas now left unprotected. Unlicensed and unreserved Crown lands need much more attention than they have ever received. This is particularly true of the Clay Belt, where relatively little has been done aside from the patrol immediately along the railway line. Unless this action is taken, there will inevitably be periodical repetitions of this year's disaster, until the country is swept practically clear of timber. There must also be a radical change in the point of view which permits small fires to smoulder unattended, until they become large ones and escape control. The reorganization of the service should include adequate provision for competent supervision of the staff, all the way from the head office down to the men in the field. The present provisions in this regard are far from adequate. Some one competent man must be designated to give his whole time to the general supervision of this important work, and he must be given a much larger staff of inspectors, in addition to an increase in the ranger force. Further, the work of the rangers should be facilitated by better provision for communication and fire-fighting. This means the construction of more roads, trails, portages, telephone lines, lookout stations, tool caches, etc. Without this mechanical equipment, it will be impossible to organize the work on a really modern and up-to-date basis. A beginning in this respect has been made in some of the forest reserves and parks, but the situation as a whole is relatively undeveloped.

3. Provision is badly needed for the reduction of the fire hazard, through the disposal of inflammable debris in certain locations. For the protection of towns and settlements, fire breaks should be cleared around them. In

Minnesota, under the fire break clause of the forestry law relating to municipalities, the State Forest Service has brought about the cleaning up of a great deal of slash and brush around many villages in the northern part of the State. This has usually taken the form, according to the State Forester, of a cleared and plowed strip, perhaps two rods wide, a quarter to a half-mile from the town, on the sides threatened. The space between the cleared strip and the town is, of course, cleared of all slash and the brush burned, or it is cultivated or pastured, if possible. The State Forester holds the opinion, in view of the experience of Minnesota, that settlements are best protected by systematic disposal of slash and debris throughout the locality, with the additional aid of a system of roads laid out to provide necessary cleared strips on the outskirts of the settlements.

It goes, of course, without saying, that in connection with the construction of colonization roads, full provision should be made for the piling and burning, within the road allowance, at a safe time, of all debris resulting from road construction. For the most part, this action has been taken in the Clay Belt. Only too frequently, however, in many parts of Canada and the United States, is the road slash left piled in windrows along the roadside, thus constituting a severe and unnecessary hazard, and preventing the road from serving the useful purpose of a fire-break in case of need. A good fire-break should not only be a vantage point from which a back-fire can be started, if need be, but it should also serve as an avenue over which men and supplies can be transported to fight fires. Roads may be made to serve the former as well as the latter purpose, if proper foresight is used. Railroads, ditches, tote roads and trails should also be considered in the general scheme of fire protection and utilized as fire-breaks wherever possible.

State Forester Cox reports that if the work is properly laid out along these lines, the cost should not be prohibitive. He finds that one of the most effective means of cutting down the number of fires in Minnesota has been the completeness with which all slash along highways, ditches and other rights of way has been cleaned up. It has meant unending work on the part of the rangers to bring about this condition, but, according to Mr. Cox, the results have justified all the trouble taken. The experience of Minnesota and of the United States Forest Service in this respect will no doubt be considered by the Government of Ontario, and it is hoped that suitable provision will be made, legislative and administrative, for putting similar measures into effect in that province.

The whole question of the disposal of logging slash, as a fire-preventive measure, has, as yet, hardly been touched anywhere in eastern Canada. Some small experiments have been made by different agencies, and information relative to the general situation both in Canada and the United States has been published.

If the loss of probably not less than 250 lives and of millions of dollars' worth of property in the recent disaster shall result in the adoption of really adequate measures for fire protection in Ontario in the future, the sacrifice will not have been altogether in vain.

Mount Rainier National Park

BY MARK DANIELS

Former Superintendent of National Parks

THE ranges of mountains that run in a more or less continuous line from southern California practically to the Canadian border are accented here and there, as it were, by peaks that raise their lofty crests far above the surrounding territory. Beginning at the southern end of the Sierra Nevadas with Mount Whitney, that range of mountains is marked in its middle portion by Mount Lassen and at its northern extremity by Mount Shasta. Passing on into the mountains of Oregon and Washington in the Cascade range, there is Mount Mazama, the top of which was blown off in times gone by, leaving the cup that now contains beautiful Crater Lake. Further north are Mount Hood and Mount Rainier, whose snow-crowned crests are visible for miles and miles throughout the surrounding territory.

With the exception of Mount Whitney, each of these peaks bears undisputed evidence of volcanic formation, with Lassen peak giving frequent evidences of its determination not to be taken from the category of active eruptives. On the top of Mount Shasta there is a hot spring which gives off steam within a few feet of perpetual snow and ice, and on Mount Rainier it is quite possible to dip out sufficient hot water from beneath the wall of a glacier to brew a grateful pot of tea without the use of fire.

Of all the peaks in the United States that stand out in marked contrast to the surrounding country, Mount Rainier is the undisputed peer. It is the Fujiyama of the United States. It stands out alone, almost detached from the remainder of the range, towering to a height of 14,408



THE ROAD FROM TACOMA, CALLED THE TACOMA "HYPHEN" NATIONAL PARK ROAD

This road, which leads to Rainier National Park, bursts out of the wonderful forest of pines onto a clear plateau that overlooks the valley which lies at the base of the great mountain. The road from the city to the Park is smooth, well built and beautiful. Inside the Park the condition is such that patriotism forbids comment on all but the scenery.

feet, with practically all of its height above the surrounding territory. Most of our other peaks, such as those in Colorado which rise to an altitude nearly equal to Mount Rainier, can be seen only from territory that is in itself at a great altitude, but Mount Rainier may be clearly

seen from the waters of Puget Sound, on whose placid surface on a calm day the reflection of this sparkling mountain in the distance is a wonderful sight to behold.

The mountain is so ever-present as not only to dominate the situation, but to intrude its individuality and



W. K. LANE'S P

NISQUALLY GLACIER, RAINIER NATIONAL PARK

... of the ...
... of the ...
... of the ...

... Rainier may be found in the windows of many photo-
... truth were told, it would be more generally known
... the development of our National Parks. It was
... taken, at the snout of Nisqually Glacier.

influence into the very social fabric of the surrounding towns. Nearly every inhabitant of the district, who pretends to such a thing as a garden, will take the itinerant visitor to the back porch, or veranda, or terrace, as the case may be, and point out how he ingeniously contrived the arrangement of his garden so that the snow-white peak of Mount Rainier terminated the vista along the major axis of his garden. While no claim is specifically laid to originality and uniqueness on the part of the garden owner using our national park as the major element in his plan, the visitor will, nevertheless, come away with the impression that there is at least one man in Washington who appreciates the beauty of one of nature's masterpieces. If, however, he visits more than one garden, he will, more than likely, conclude that the inhabitants of the districts are not at all sociable, for none seems to know that his neighbor's garden is axed on the same glorious peak.

The mountain is of such a commanding height that it is plainly visible from Seattle and Tacoma, in fact so much so, that to the residents of these two cities it has become part and parcel of their local scenery. What, then, could be more natural than a struggle for its control? Before its discovery by the whites, the mountain was called Tacoma by the Clickitats, Yakimas and other Indian tribes of the district. So far as I have been able to learn, this name means "the great snow." The naming of the peak, "Mount Rainier," in honor of Rainier, the famous explorer, has therefore, for many years, been a thorn in the side of the residents of the city of Tacoma. A feud finally developed between the two cities for the

possession and control of the Park's development, and this feud grew to such an extent that many dear friends were estranged and there was naught but bitterness between them. The story is told of one of our prominent national characters, who, in his visits to these two cities for the purpose of gathering the autumn crop of votes, became so confused that he could not keep in mind when he should call it Mount Tacoma and when Mount Rainier. His secretary had advised him, therefore, in his speeches

in the two cities to call it only "the mountain." At the end of an arduous day in Seattle he closed his speech before a large gathering with his impressions of the beautiful snow-capped peak and terminated his sentence with the words "Mount Tacoma." His secretary was on the platform and when he heard this he uttered a deep groan and said, in a voice that was plainly audible to the twelve hundred enraptured listeners, "Hell, now you've lost twelve hundred votes!"

An account of the struggle and how the trend of battle ran through

years would fill a small volume which, as a matter of fact, has no part in this argument. Suffice it to say, however, that the hatchet has been buried and there is now an organization composed of citizens of both communities who work in apparent harmony for the benefit of the Park; so much so, in fact, that by virtue of persistent pounding they have secured a sufficient appropriation from Congress to actually build some new bits of road in the Park.

There are few places in the world one may drive an automobile right up to the snout of a mighty glacier. The only place in the United States that I know of where



THE NISQUALLY GLACIER

The snout of Nisqually Glacier reaches down to within a few hundred yards from the highway. The dark mass in the center is the glacier, although it looks more like a heap of earth than a giant cake of ice. The first view of a glacier's toes is always one that destroys any youthful ideal as to the "huge wall of sparkling ice."

this can be done is in Mount Rainier National Park. There is a highway leading out of Tacoma which (it must be stated, lest another feud be started, leads also from Seattle) passes through a forest of Oregon pine that is unsurpassed on any motor highway in the world. This road enters the Park almost exactly at its southwestern corner and traverses a mile or so of the Park and then runs out and in again for another two miles, finally entering the Park about a mile from Longmire Springs. From here on it follows the Nisqually, climbing through a difference in elevation of 1500 feet to within a few hundred yards of the snout of the Nisqually Glacier.

The appearance of this portion of the glacier is quite disillusioning, for the lower end of the "river of ice" is covered with dirt and disintegrated stone so that it is hardly recognizable as snow and ice. From this point the road swings around the ex-

ceedingly steep wall of the canyon to Ricksecker Point. For a half mile around this point the view is stupendous. The Tatoosh range of mountains is just across the canyon, into which it casts the purple shadows of its jagged peaks. From Ricksecker Point the road climbs steadily through a vertical distance of 1500 feet to Reese's Camp in Paradise Valley. Every turn of the road displays to view some new and startling formation of the Tatoosh range as well as intimate peeps of the glaciers on the mountain slope.

Whoever named Paradise Valley did so, I am certain, with no intent to exaggerate. It is a fairly open stretch of grass-covered land, perhaps a mile and a half

in length, strewn with the most marvellous variety of wild flowers imaginable. With the sparkling white snow and ice in the background, the kaleidoscopic colors of this little valley and its surrounding slopes present a picture in color harmony that would test the versatility of a Brangwyn. Surrounding this wonderful place are a great number of spots almost equally beautiful though

less aptly named. There is a small creek called Edith Creek, a beautiful miniature plateau called Frog Heaven, Stevens Glacier, and, as might be expected, another of the innumerable Louise Lakes. I have never checked it up, but I doubt if there is a picturesque spot equal in area to Mount Rainier National Park which has not a Louise or Eleanor Lake. In the case of Glacier National Park the committee on names varied their nomenclature applied to the category of beautiful lakes to such an extent as to call one of the lakes "Lake Ellen Wilson." What



JOY SLIDING ON AN AUGUST DAY, RAINIER NATIONAL PARK

Strangely enough, there is only a slight accumulation of moisture in the clothing when this form of pastime is engaged in. Such times, however, are infrequent, for the minds of even the hardest of mountain climbers are fully occupied with the problems of the ascent. The snow, in almost every instance, is quite dry and extends temptations to sport lovers but their joy is generally short-lived.

ingeniousness! What wonderful imagery! We are truly coming on apace. It only remains to change the name, in honor of our coal barons, from Tatoosh Range to Gas Range to show the world that we are a truly modern people, up to all of the little tricks of the trade that substantiate our claims for a high position amongst the nations of higher civilization.

Unfortunately, the automobile cannot carry the tourist further into the Park than Paradise Valley, which is really just over the line. From this point, to and through 200,000 acres beyond, one must travel afoot or horseback. Congress has been, for once, more or less justified in displaying a "reasonable" amount of reticence over

the building of an encircling road, for there are canyons and hogbacks that reach down from the crest of the peak in a way that is well calculated to discourage the most intrepid road builder. Added to these are a series of huge glaciers thrusting their snouts out into the surrounding territory like the tentacles of an octopus that discourage the over-ambitious; nevertheless, a highway has been planned and, in fact, tentatively surveyed, which would encircle the mountain, giving access to the innumerable

Many people who have climbed the Alps would undoubtedly be inclined to disparage Mount Rainier if they had not been there, but no less an authority than Professor Joseph N. Le Conte gave it as his opinion that there was no single system of glaciers in Switzerland which could surpass the system that crowns Mount Rainier. Just how glaciers are counted, when most of them seem to join in one solid mass of ice, I do not know but I have heard it stated, by those who have had lessons in plain and fancy



BIG CEDARS IN RAINIER NATIONAL PARK

The charms of Mount Rainier National Park are not confined to glaciers and misappropriated masculine costumes. There are verdant forests of giant cedar which cast their somber shadows across the paths like deep purple mottles upon the carpet of inviting green. These trees are among the largest of their species in the world and possess an individuality that is surpassed only by the strange and weird impressiveness of the California sequoias.

wonderful valleys, canyons and glaciers that abound on all sides of the peak, and it is to be hoped that sooner or later this road will be built.

From Paradise Valley there is one established route for reaching the summit. The trail of this route follows along the hogback from Paradise Valley over the most easily negotiated snow fields to a point called Camp Muir at an elevation of 10,000 feet. From there the climbing becomes arduous and somewhat dangerous. It is, in fact, so dangerous as to be unsafe for those who are not experienced in negotiating glaciers and should not be taken without a guide.

counting, that there are over twenty-five glaciers in this Park, and that these glaciers cover an area in excess of forty square miles. The names of some of these glaciers are particularly interesting. There are the Frying Pan, Emmons, Winthrop, Russell, Flett, Success, Van Trump, Wilson and Stevens Glaciers. One is curious to know whether the list of proper names was exhausted before Tahoma Glacier was given its beautiful, musical name.

On the eastern slope the glaciers seem to be broken and more disconnected than on the northern slope, but the surrounding country is not less beautiful. The glaciers that extend to the north are considerably larger

than those on any of the other sides of the mountain. This is only natural, as the northern slopes receive much less sun. The Carbon Glacier is perhaps the longest in the system and reaches down to form the source of the Carbon River. Lying between the Carbon Glacier and its nearest big neighbor are Spray Park and Seattle Park,

It would seem that the exigencies of political expediency alone would be sufficient to secure an appropriation from Congress for the proper development of this Park, for it lies within a short automobile ride from the two cities of Tacoma and Seattle (or perhaps Seattle and Tacoma), and is the only great national park where the residents of large cities can spend their Sundays picnicking. It would appear, therefore, to be politically expedient to do something really worth while in this Park if for no other reason than that such action would undoubtedly develop considerable vote-getting propensities. Perhaps, if the lovers of nature could get the national parks into the Rivers and Harbors Bill, the long-practised custom of over-appropriation in that branch of our Federal Government might be made to apply to our scenic areas. But possibly the knowledge that this peak, which was once so well loved by the Indians, has been thoroughly taken away from them, has caused the interest of those in power to be diverted to other districts where the Indians still have a hold, at least in their minds, upon their small remaining territory.



PARADISE PARK AND TATOOSH RANGE

The Tatoosh range presents, as true lovers of mountain scenery view it, the most picturesque view in the Park. The serrated crest of the range is sharply defined by the southern sky, against whose brilliant blues the towering pinnacles stand out like watch-towers of fairyland.

the latter being one that is seldom mentioned in the vicinity of Tacoma. It is a bit confusing to find that most of the beauty spots inside the National Park are themselves named Parks, such as Vernal Park, Moraine Park, Spray Park and many others.

An unfortunate circumstance in the present arrangement of roads entering the Park is that they are in no way connected up within the Park boundaries. As a result, if one wishes to visit the great number of wonderful sights and to become familiar with the variety of scenery that is available, it is necessary to back out and attack the Park from some other point of entrance. It is quite possible to reach a point near the northwestern corner of the Park by automobile, from whence the Mother Mountain country and the Carbon and Russell Glaciers can be reached by trail. There are practically no facilities, however, for pack train travel in this immediate district, and to get from this country over to the northeastern or southeastern corners one must retrace and attack the problem again.

There is, undoubtedly, no district in the United States of the area of Mount Rainier National Park which has such a tremendous diversity of scenery or is so broken by canyons, mountain walls and glaciers. For this very reason the tourist or mountain climber who visits the district is immediately fired with a burning desire to exhaust at least a portion of its tremendous scenic resources, and his humor is in no wise softened by the knowledge of the fact that the money necessary to build an encircling highway about the peak was consumed last year by the expenditure of \$200,000 for the erection of a white stone postoffice in Squeegee, North Dakota.



NISQUALLY GLACIER AND RIVER

From this point is to be seen one of the most impressive views in the Park. The stream in the narrow valley is well filled all the year round and the glacier in the distance moves at the rate of sixteen inches a day.

The Indians in this district held Mount Rainier or Tacoma, as they called it, in reverential awe, in fact, one author has written a book upon the subject entitled "The

Mountain that was God." Why he should have used the past tense is not clearly understood, for if ever a country and people were dominated and inspired by a God-like spectacle, the people of the vicinity of Mount Rainier are held to-day in that dominion. That the Indians in past days worshipped at the shrine of this glorious spectacle in their simple obvious manner is no indication that none of us holds in his breast an equally reverential love of this mountain which once was and still is God of our peaks.

There is a theory that seems to be more or less founded upon observation and facts to the effect that man's mental development is largely influenced by what he sees, that the constant intrusion upon one's sense of the tawdry will in time bring down the standard of intellect and character, and that repeated contemplation of an inspiring view will in time lift the character to the levels above normal. Whether or not this is true to any great extent, there is little doubt that constant, intimate association with the beautiful undoubtedly influences character for the better. In the light of this theory, it is difficult for some of us who do not thoroughly understand the nature of the Japanese to appreciate the fact that Fujiyama, that most glorious of peaks, has largely influenced and moulded the character of the people of Japan. Nevertheless, it is my opinion, and the belief of others, that a certain element of sublimity of nature and sturdiness of character, which we know the Japanese possess, may be traced to their intimate knowledge of the beautiful scenery of their Island and their relationship with the "holy mountain." This being the case, the citizens in the vicinity of Mount Rainier should deem themselves most blessed, for they may raise their children at the very base of one of the most beautiful, impressive and inspiring mountains that can be seen on earth.

The glaciers on Mount Rainier are quite different from those to be found in Glacier National Park. In the former case they are actual active glaciers or rivers of flowing ice, as all true exponents of literary phraseology love to call them. The glaciers on Rainier are perform-

ing their age-old process of sculpturing the great stone mountain into shapes that will, in future generations, present puzzles to geologists. In fact, the Nisqually Glacier is said to move about sixteen inches a day, cutting and scouring the bottom of its channel with the great boulders that are embedded in its bottom like diamonds in the face of a drill. All the great glaciers of Mount

Rainier are flowing quite rapidly. On the other hand, the glaciers of Glacier National Park are largely dormant. The large proportion of them are moving to some extent but they are not actively engaged in the real work of glaciers. They seem to be exhausted and in the last stages of their activities. Some of them are just huge cakes of ice which are, by comparison, mere bits of frozen residue from great glaciers that were, hundreds of centuries ago, perhaps a thousand times greater in size. They rest quietly in the cup of their great beds that were carved from the living rock in the days of their youth.

It is difficult for those uninitiated into the mysteries of glacial action and geological formations to appreciate how a cake of ice can cut a canyon a thousand feet deep. But it is their huge weight and slow movement which accomplish the end, and when it is realized that the ice of the Nisqually Glacier alone is more than one thousand feet thick in some places, the tremendous pressure

that it exerts can be partially appreciated.

The streams from active glaciers are colored with a slightly milky hue. The infinitesimally fine particles that are the product of glacial scouring are held in suspension or solution within the waters so that, after becoming familiar with the appearance of glacier water, one may invariably recognize the flow from beneath an active glacier. This does not in any way contaminate the water or make it unfit for domestic use, as seems to be the opinion of most tourists who see that for the first time.

There is a fascination, which is not born only of the danger involved, in climbing these great ice fields. As a result many people who are physically and otherwise not qualified to essay the exceedingly exhausting ascent to Mount Rainier do so with the tourist's usual



A TOWERING PEAK

Rugged scenery is one of the features of Mount Rainier National Park, and this view is one of many which keep the observer interested for hours at a time.

indifference to the good advice of Government officials. As a matter of fact there is but one route over which the ascent to the summit of Mount Rainier is possible, and should one, fired with the valor of ignorance, attempt to find another and lose his way there is no hope of getting out. To many, the loss of lives of those who do not use



A STUDY IN BLACK AND WHITE

Against the almost black of the heavily wooded slope in the middle distance the snow-clad range in the background makes a striking contrast.

their intelligence in such cases, by taking the advice of officials, is a matter of no moment, but to the Government the fact that several lives have been lost to venturesome but inexperienced climbers is a matter of seriousness. The danger of climbing Mount Rainier does not lurk only in the problem of mountaineering, but also in the weather conditions. At an altitude of from 10,000 to 14,000 feet the wind storms and snow storms are not tempered to the "shorn lamb" and it is not unusual to find a stretch of several days when the ascent to the peak would be utterly impossible. Should a mountaineer be caught in some of the heavy snow storms there would be no possible opportunity of coming out alive, and if he were to encounter one of the fierce wind storms no form of footing could save him from being blown into a crevasse.

Of all the parks in our system, Rainier is certainly deserving of further development. Its proximity to a large population, its tremendous interest as the only immediately accessible system of glaciers in the United States, its marvellous beauty and inspiring dignity and its many lakes and fields of wild flowers would justify an

expenditure many, many times as great as the appropriation allotted. In a park of 207,360 acres, the area of which does not include anything but the cream of scenery, the Federal Government has built a mere snip of a few miles of road which barely reaches the snout of one glacier. It has built a few trails leading to other parts and has done nothing else.

What is needed is an encircling road that shall pass entirely around the Mountain on practical grade. From this encircling road should be constructed entrance roads from each of the corners so that one might enter on any side of the park, strike the encircling road, swing around it as far as desired and exit at another side. From this encircling road should be built trails and small spur roads to such interesting spots as Spray Park, Reflection Lakes, and other specially attractive locations. Whether this will ever be done or not is difficult to determine. It is certain, however, that if Mount Rainier were a possession of any of the European countries it would be developed to its maximum in a very short time, for the people of Europe have learned that scenery is a national resource as much as coal and timber and that it can be sold over and over again without a reduction in the original bulk of the commodity.

MEMORIAL TABLET FOR GEORGE W. VANDERBILT

IN acquiring the tract of rough mountain land known as Pisgah Forest, adjacent to his estate at Biltmore, North Carolina, and in placing the management of this area in the hands of a professional forester as early as 1897, Mr. George W. Vanderbilt became a pioneer in the encouragement of national forest management of private lands in this country. Through the opportunity thus offered, Gifford Pinchot, and later Dr. C. A. Schenck, conducted numerous instructive operations. The inspiration of this work undoubtedly was most instrumental in launching the campaign for national forests in the Appalachians. From small beginnings great movements spring.

Following Mr. Vanderbilt's death, the tract was offered by Mrs. Vanderbilt to the government and was purchased at \$5.00 per acre. The acreage was 80,398 acres. This purchase was subject to a timber contract which runs for 20 years, under which the mature timber, measuring over 18 inches at the ground, may be cut and removed.

In recognition of his great and lasting service to forestry in this region, the Southern Forestry Congress, held at Asheville recently, voted to erect a memorial tablet to Mr. Vanderbilt at the entrance to Pisgah Forest. A committee was appointed to raise the necessary funds, the members of which are Governor Locke Craig, Raleigh, N. C.; Dr. Joseph Hyde Pratt, Chapel Hill, N. C.; Dr. W. H. Holmes, Smithsonian Institution, Washington, D. C.; Charles Lathrop Pack, Lakewood, N. J.; Henry S. Graves, U. S. Forest Service, Washington, D. C.; George F. Kunz, president, American Scenic and Historic Preservation Society, New York City, and George S. Powell, secretary of the Appalachian Park Association, Asheville, N. C.

The Bird Department

BY A. A. ALLEN, PH.D.

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AUTUMN BIRDS AND THEIR MESSAGE

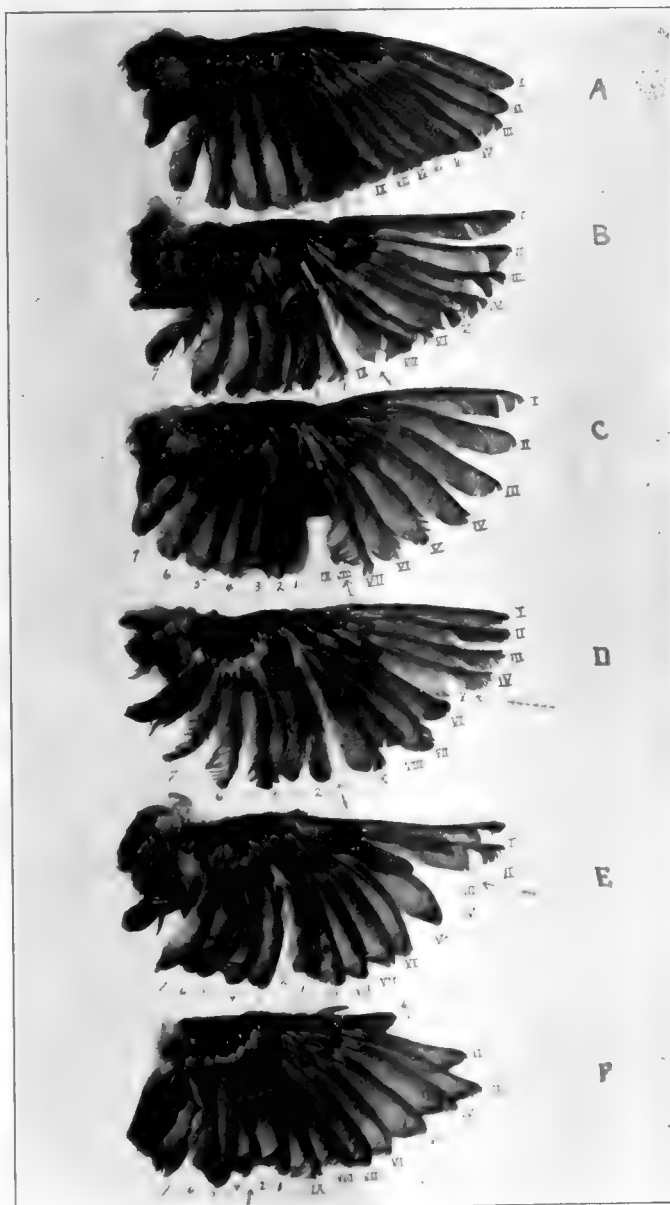
NO phenomenon of nature is more striking to the observant watcher as he enters the September woods than the change that has been wrought in the realm of birds. The hundreds of shrill voices that claimed his attention during spring and summer are now hushed and he hears only the occasional notes of a red-eyed vireo or a wood pewee. So quiet are the tree-tops and so silent the forest floor that he is almost ready to believe that the birds are gone, but, as he traces the border of the woods further, he suddenly finds himself in the midst of a flock of birds even more numerous than the hosts of spring. They are scratching in the leaves, shaking the bushes and weeds and chipping in the tree-tops in such manner as to announce their presence beyond any doubt, although they be difficult or even impossible to see.

In the fall the birds are no longer scattered evenly through the woods and fields but have gathered in flocks, sometimes many species together, and are moving slowly southward. Where food is abundant they stop for some time, but they shun all places where food and water are scarce. In spite of their numbers, however, they are difficult to see among autumn greens and browns, for the familiar liveries of spring have been discarded for suitable travelling attire. Little change has come over the sparrows and vireos, whose dull plumages serve for both summer and winter, but the bright tanagers, buntings and warblers have now assumed the modest dress of the females and

even the robin has his red breast tinged with gray. Let us see, then, what has been happening during the past few weeks to work these remarkable transformations.

August is the month of molting, the season when birds change their faded, worn plumage for fresh feathers, often of a different color. The process, however, is such a gradual one that, although every feather is shed and replaced, one scarcely knows that it is taking place unless

there is a change in color as well. Beginning always at a definite feather, usually the innermost primary wing feather, the molt proceeds with regular sequence until all the feathers are replaced. The second feather is not lost until the first is partially grown, and, before the third and fourth are lost, the first is practically matured. The same is true of the tail feathers, so that a bird is never without the use of its locomotor organs and steering gear. An exception to this rule is found in the ducks and diving birds which are not dependent upon their wings to escape their enemies and which, therefore, can safely molt all of their primaries at the same time and be temporarily deprived of the power of flight. On the bird's body, likewise, the molt proceeds gradually from a definite point, only a few feathers being lost at a time. The half-naked chickens seen in many farm yards are examples of arrested feather development which does not occur in nature except in cases of disease. As almost everyone knows, feathers are not born indiscriminately over a bird's body but along definite lines called feather



A SERIES OF MOLTING SPARROWS' WINGS

Showing the way in which the feathers are replaced, beginning with the innermost primary (IX) and working gradually each way. Roman numerals indicate primaries, arabic, secondaries. The arrows indicate the progress of the molt.

tracts. Between the feather tracts, which are apparently regular in every species of bird, there are extensive bare areas which are dependent upon the overlapping of the feathers of adjacent tracts for protection. In the young of most birds, until the feathers are matured, the feather tracts (pterylæ) and the naked spaces (apteria) are very conspicuous. The sickly chickens appear so naked because the bare spaces are entirely exposed by the scarcity of feathers in every tract.



A MOLTING SPARROW

Showing the replacement of feathers. The new feathers appear darker than the old and include all but three of the primaries, one secondary, the wing coverts and a few feathers on the back. Several of the central tail feathers have been lost but not yet replaced.

Most birds molt but once a year, but it would obviously be impossible for a bird that changes to a dull coat after the nesting season to assume its brilliant breeding plumage without another molt in the spring. Thus we find in the case of the scarlet tanager, goldfinch, bobolink and other brilliantly colored species that the males undergo a spring or "pre-nuptial" molt as well as a fall or "post-nuptial" change of plumage. The pre-nuptial molt is usually incomplete, however, as the wings and tail feathers, which are dull even in brightly colored birds, are made to serve both plumages.

In some birds, however, where there is a conspicuous change in color from the winter to the breeding plumage, it is accomplished in another way known as "feather wear." This is possible because each feather is tipped with a color different from the main portion of the plume. The feather tips give the general color to the fall and winter plumage, but as they wear off, the underlying breeding color is exposed. Browns, yellows and grays occur most frequently as color-tips with blacks, browns or reds beneath. The robin's breast becomes much redder with the advance of spring because the gray tips of the feathers wear off. The black spot on the throat of the house-sparrow and that on the breast of the meadowlark treble in size. The red-winged blackbird loses his reddish-brown cast and becomes intensely black, while the

snow bunting wears away the dusky from its head and breast and shows snowy white.

In birds like the purple finch and indigo bunting, where there are no apparent gray tips to the feathers and which still seem to become more intensely colored as the season advances, the feather wear is of a different sort. It was formerly believed that the feathers became repigmented from the blood of the bird but to-day that is considered impossible, because once the feather is mature, it is a dead structure, physiologically disconnected from the bird's body and serving only in a mechanical way for flight and protection. To understand what actually happens in the case of these birds, it is necessary to know something of the structure of a feather as shown under the lens.

All feathers are composed of a mid-vein or shaft and the web. If the web is examined carefully it will be seen



A PAIR OF HOUSE SPARROWS

These birds are in their summer plumage. The sparrow has no spring molt, but by the wearing away of the gray tips of the feathers a considerable change in color ensues, especially on the throat of the male.

to be composed of a series of fibers called "barbs" attached on each side of the shaft. Each barb, similarly, bears rows of small barbules. When these barbules are examined under the microscope they are found to bear a number of minute recurved hooklets which fasten into the hooklets of adjacent barbules and give to the feather its firmness, being best developed in the wing feathers, which require the greatest strength. Some feathers and the innermost parts of most feathers lack this device and are therefore always soft and fluffy, giving little resistance to the passage of air through them. Now in the case of the purple finch and indigo bunting, the red and the blue colors are located mostly in the barbs while the barbules and hooklets are dusky. With the wearing away of the hooks and the barbules on the body feathers, the barbs become more conspicuous and the color of the bird becomes apparently more intense.

That molting is not confined to birds is well recognized and its homology to the "shedding of the skin" in reptiles and amphibians is conceded. Of course, the snake or the salamander does not actually shed its skin but merely the hard outer cuticle. This cuticle, as in the case of the birds' feathers, when fully formed is a dead structure and it is inelastic. Consequently, as the snake or salamander grows, this "shell" becomes too small for it and must be replaced by a larger one. The more food one of these cold-blooded animals consumes, the more rapidly it grows and the more often it has to molt. It is not seriously discommoded by the process, however, except for a short time when the loosened cuticle over the eye becomes opaque and renders it nearly blind. When this occurs the animal rubs its nose against a stone, splitting the hard cuticle and then gradually wiggles itself free, leaving the skin entire, a sort of a ghost of its former self.

With birds the molting is a more serious matter. It

in large flocks to roost in the marshes and each morning leaving again to feed on the upland fields. The sexes separate in flocks by themselves and show little interest in each other. Suddenly the male birds disappear, shortly the females follow and there ensues a period of several weeks when no blackbirds are seen either morning or evening, nor are they to be seen during the day about the marshes. In a few weeks they appear again and this time in even larger numbers than before, for they have been



ANOTHER PAIR OF HOUSE SPARROWS

These birds are now in their winter plumage. The black spot on the throat of the male is largely concealed by the gray tips of the feathers.

requires far more energy to grow a new set of feathers than merely to form a new cuticle, in fact, so much so that most of the other activities must stop and the bird's entire strength be given to molting. As a result song ceases, fighting and display are never indulged in, and nesting activities are completed and out of the way. The birds retire to the thickets and move about only in search of food. It is a period of sickness or indisposition and the birds shun each other's company. During the molting time many birds practically disappear and are nowhere to be seen for several weeks. The red-winged blackbirds, for example, are very abundant in all the marshes until the last of August. Each evening they can be seen flying



A YOUNG GREEN HERON

Showing the feather tracts and naked areas between found in all birds. The bare areas are later entirely concealed by the overlapping of the feathers of adjacent tracts.

joined by migrating birds from the north. In former years it was supposed that the early disappearance was caused by the resident birds leaving for the south and that the reappearance of blackbirds announced the arrival of birds from the north, but the unaccountable part of the story was that although the August birds were supposed to be leaving for the south, they never arrived. Instead, the blackbirds in the south likewise disappeared and were supposed to be moving eastward to the rice fields. The mystery of their disappearance, however, can easily be explained by anyone who will venture out into the heart of the larger marshes during the first of September, for there he will find, after sufficient search, large flocks of short-winged, short-tailed blackbirds skulking about the more open areas and hesitating to fly far. For it is at this period that they are just completing their molts by the

replacement of the outer primary wing feathers, the loss of which, in shortening the wing, makes flight difficult and the long trips to and from the uplands practically impossible. Hence they are seldom seen and it might easily be thought that they had left for other parts.

Thus it is with other birds also. They cease singing and go into hiding until the



A SPOTTED SALAMANDER

Note its molted skin. Snakes and salamanders molt the cuticle entire by splitting it at the nose and wiggling out. They molt at irregular intervals, dependent largely upon the food supply. Birds, on the other hand, molt at a fixed time, once or twice a year, losing but a few feathers at a time and replacing them as fast as they are lost.

molting is practically completed, but it is not long before they regain their former vitality and some even revive their full springtime songs. The majority, however, prefer to rest after their strenuous labors, filling their crops with fruits and seeds and laying up a storage of fat that will serve them in the long journeys that they are about to undertake.

The Larks

ALTHOUGH over 225 members of the lark family, including species and sub-species, have been described, there is but one species, the horned lark, found in North America, all others being found in Europe, Central Asia and the plains of Africa. The North American bird is widely distributed from ocean to ocean and from Mexico to Alaska, but is most abundant in the Mississippi Valley. It is a permanent resident wherever found, except in the northern part of its range, and its non-migratory habits and general adaptability have brought about a great deal of variation in the birds living in different parts of the country, as many as 20 geographic races having been recognized. The bird, for example, found along the Atlantic coast in winter and nesting in Labrador and Hudson Bay region is the common horned lark or shorelark; the bird of interior New England, New York and the Mississippi Valley is the prairie horned lark, while further west we find the pallid, the desert, the ruddy, the scorched and the dusky-horned larks. All, however, are so similar as to be indistinguishable except by a specialist.

Although the horned lark is the only native species of lark, the European skylark has been introduced into Oregon and Long Island and while not multiplying very rapidly, it still holds its own and sings with all the fervor of its European brothers. The meadowlark, which is even more abundant than the horned larks, belongs to the blackbird family (Icteridae) and will not be considered at this time.

Larks, in general, are sparrowlike birds but with smaller, rounded bills, rounded tarsi and greatly elongated hind toe-nails. The American horned larks are easily



A PRAIRIE HORNED LARK

Showing the characteristic black markings about the face. Larks are permanent residents in all except the most northern parts of their range and are found throughout North America.

distinguished from any of the sparrows by the curious black markings about the face and the little tufts of erectile black feathers on the head. They frequent open

farming country and prairie land, travelling in flocks except when nesting, and having sociable, unsuspecting natures, so that one may often approach very close to them. They often run along ahead of one in the road until pressed too closely, when they mount into the air with cheerful whistles.

The horned larks begin to nest very early in the spring and often the nests are overtaken by late snows, as shown in the illustration. The nest itself is placed in a depression in the sod with no protection whatsoever, but the olive or grayish speckled eggs are, nevertheless, quite inconspicuous even when left uncovered.



NEST OF THE HORNED LARK

Built during early March and overtaken by a late fall of snow. The bird was flushed from the nest by the photographer.

During the breeding season the males perform aerial evolutions which quite equal those of the skylark in daring if not in melody. Mounting upwards on a great spiral, the bird ascends until nearly lost to view. Then poising for a few moments and breaking into song, it undertakes a thrilling dive toward the earth, closing its wings and dropping like a plummet, threatening to dash itself to pieces, but finally, when within four or five feet of the earth, it catches itself, swerves and very gracefully alights.

Except during the nesting season, the food of the horned lark is largely the seeds of weeds, only twenty per cent being composed of insects. In some localities, especially in California, complaints have been made against them because their fondness for seeds has taken them into the newly planted fields and they have consumed large quantities of seed wheat. In these places the wheat is sown broadcast and it naturally attracts many birds, such as the mourning dove, meadowlark and blackbirds, as well as the horned larks, and undoubtedly considerable damage is done. It can easily be averted, however, by drilling the wheat, and certainly it is a most near-sighted policy that allows these birds to be shot or poisoned when their services in destroying insects and weeds are so much

needed. For during the nesting season over forty per cent of their food consists of grasshoppers, white grubs, cutworms, weevils, chinch bugs, etc., while nestlings are fed almost entirely upon insects. And at other times of the year, though the numbers of insects destroyed be smaller, they are of great value in consuming such obnoxious weeds as fox-tail and crab-grass, amaranthus, pig-weed, bur-clover and corn-cockle, the seeds of which are a very important item in their food.

In former years, especially in California, larks were shot and poisoned about the grain fields or netted for the markets of the larger cities, where they were sold as "reed birds," but to-day, because of a better understanding of their economic value, they are deservedly protected by law.

NATIONAL FOREST RECEIPTS

RECEIPTS from national forests for the fiscal year 1916 reached the high-water mark of approximately \$2,820,000, according to figures just compiled. This is \$341,000 above the 1915 total, which in turn exceeded any previous year. Officials say that the gain was due to increased demand for all classes of forest products.

There was a decided growth in the revenue from all sources, the largest being that of \$203,000 in timber sales. Grazing fees showed a gain of \$77,000. Receipts for water-power development were over \$12,000 more than for 1915. Sales of turpentine privileges and charges for special uses were both considerably in excess of the previous year.

WESTERN FORESTRY MEETING

THE annual "forest industry conference" of the Western Forestry and Conservation Association and the annual Pacific Logging Congress will be held jointly again this year, in Portland, October 24 to 27. These are the two largest gatherings of Pacific coast forest interests, being attended by lumbermen, state and government officials and railroad representatives from the five western timbered states from Montana to California and from western Canada. Prior to 1915 they were held separately, but a joint session in San Francisco during the fair proved the advantage of a single occasion when the attendance is so largely identical.

October 24 will be devoted to protective problems and October 25 to matters of general lumber interest, including such topics as the Government's lumber study, Canadian lumber affairs, foreign trade, and better correlation of organized effort to improve the industry. Representatives of the Federal Trade Commission, the Forest Service, the Department of Commerce and the National Lumber Manufacturers' Association will be present. October 26 and 27 the Pacific Logging Congress will be in session to discuss improvements in logging practice, leaving the last evening by special train to spend October 28 in the Crays' Harbor camps to see field demonstration.

The Appalachian Forest Purchases

BY HON. JOHN W. WEEKS

U. S. Senator from Massachusetts

PERHAPS I cannot do better in speaking about forest conservation than to call attention to the work of the National Forest Reservation Commission which has had charge of the purchases made in the White Mountain and Appalachian regions under what is known as the Weeks Act. The original appropriation for this purpose amounted to eleven million dollars, to be expended during the six years following the passage of the act; but the Commission followed such a prudent and careful course that it was not possible to organize sufficiently to take up the examination and purchase of lands during the first two years of the life of the appropriation. For that reason three million dollars of the appropriation lapsed and only eight millions, or substantially that amount, has been expended up to this time.

Senator Gallinger, of New Hampshire, who is a member of the Commission, recently offered an amendment to the Agricultural Appropriation Bill providing a million dollars to be expended in continuing these forest purchases during the fiscal year ending the thirtieth of next June and two million for the fiscal year ending the thirtieth of June, 1918. This measure passed on August 5th. This is really a reappropriation and is one of the most com-

mendable actions taken in forestry matters since the passage of the original law.

Having followed with some care the work of this Commission from the financial standpoint, it is my impression that the purchases made have been entirely justified and that, as in the case of the State of New

York, the Government will eventually reap a very substantial profit if it wishes to dispose of the lands, and if the timber is carefully cut that there will be for all time a substantial return on the original investment.

In addition to this work, the provisions in the original law for the protection of forests from fire have, in my judgment, saved timber having a value of many times the cost of the service; in fact, one of the greatest advances made in recent years has been the effectiveness of the fire service, coöperated in by the States in the East and conducted by the Forest Service in the Rocky Mountain sections. While

there is no way to compute the actual results in dollars and cents, based on the destruction from fires in years past, it is safe to say that the saving from this one service has been greater than the whole expenditure for the Forest Service since its establishment.



Photo by Henry Havelock Pierce, Boston, Mass.

HON. JOHN W. WEEKS

United States Senator from Massachusetts and Vice-president of the American Forestry Association.

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Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

EDITED BY J. J. LEVISON, B.A., M.F.

SELECTING TREES FOR PLANTING

WHILE spring is the time for *planting*, the preparations for planting should commence in the fall. Fall is the time to purchase trees and leave them standing labelled in the nursery for spring delivery. Holes in the sidewalk about five feet long, three feet wide and three feet deep may be opened in the fall and the ashes, tin cans and bottles frequently composing a street soil may be changed for two cubic yards of rich black loam.

In selecting the trees for street planting, consideration should be given not only to the species but to the *specimen* as well. The specimen tree should be about 2½ inches in diameter, should possess a straight trunk, a definite leader and a symmetrical crown, commencing at seven to nine feet from the ground. It is sometimes difficult to find trees that will, in every respect, meet these specifications and it might then be well to agree to a smaller diameter, but to insist on well-formed specimens. Individual perfection, symmetry and uniformity are fundamental principles in successful street planting. For this reason, it is important to plant trees of the same species on the same street or at least on a stretch of several blocks; to have all trees of uniform size and to set them out at equal distances apart. Thirty feet apart is a suitable distance for most street trees and a tree like the elm should be allowed sixty feet. It is in the realization of just such points wherein lie the advantages in having a municipality undertake such work. If left to the citizens to do this individually, the trees will be planted either too close or too far apart. Many species will be mixed on the same block and many blocks will have no trees at all.

As to the *selection of the species*, that will, of course, vary with the region and local conditions. In a general way, however, persons in the East will find the *oriental sycamore* the hardiest of all for street planting. The sycamore has

lately been slightly afflicted with a leaf blight (*gloeosporium nervisequum*), but the disease has not become general enough to do serious damage. The *Norway maple* is another tree equally desirable. The oaks, though of slower growth at first, are by far the noblest and most long-lived trees. The *red, pin and scarlet oaks* are the three best species for street purposes. The red oak is the fastest growing and least fastidious in its soil and moisture requirements. The pin oak is most beautiful when its low pendulous branches are disturbed as little as possible and when its roots can get plenty of moisture. The tree is therefore best adapted for suburban sections. The scarlet oak is worth the trial for its persistent and brilliant foliage. The *Ginkgo* has demonstrated its adaptability to poor soils, to unfavorable city conditions and its resistance to insects and disease. It should be tried to a greater extent for street planting than it generally is. The *English elm* is another tree doing well in many large cities.

There are a number of trees that are planted for their admirable qualities of either form, color or beauty of their flowers, but, requiring special favorable conditions and care, they should be chosen with a greater degree of hesitancy than the above and planted preferably in the suburban sections rather than in the heart of the city. The principal of these are the sugar and red maple, European linden, horse-chestnut, American elm and tulip tree.

The *sugar maple* has a symmetrical form and combines many shades of color in the fall, but requires plenty of moisture. In the vicinity of New York City, the trees of this species planted in the heart of the city are rapidly dying off and there is no other cause attributable for this condition except the excessive evaporation from the leaves against the meagre quantity of moisture taken in by the roots from the impoverished street soil.

The *red maple* and the *linden* are both moisture-lov-



A WELL PLANTED STREET

Here are two fine rows of Norway maples which, with a few years' growth, will give a bountiful shade. The street is in Brooklyn, where expert attention is given to street tree planting.

ing trees and the latter is a favorite food for insect pests. The *European linden* is the better tree for street planting. The *American linden* grows very straggly in the vicinity of New York, though it seems to do better further south. The *horse-chestnut* prefers a rich soil and is subject to a fungous disease, which discolors its leaves, causing them to drop in midsummer. It is also a common victim of



PROTECTING THE MAPLE

In the centre is a small but hardy Norway maple and upon each side are poplars of larger growth which have been placed there temporarily.

"slime flux," a disease that causes the flow of sap from crevices in the trunk. The tree is used extensively abroad for street planting, but, for reasons just stated, should be used more sparingly in this country. The *elm* has the noblest form of all our shade trees, but should only be planted on wide avenues, in suburban sections where it can find a deep, rich, moist soil and plenty of unvitiated air. The tulip tree compares favorably with other species in form and attractiveness, but it is so exacting in its soil and moisture requirements that only young specimens should be used and its planting restricted to suburban sections.

The objectionable trees for street planting are all the *poplars*, the *silver* and *sycamore maples*, the *catalpa* and *male ailanthus*. The poplars are very short-lived trees. They are dangerous in wind-storms and grow so fast as to require constant cutting back. At a certain age their roots upset the sidewalk and their fine rootlets clog the neighboring water and sewer pipes. Their leaves drop very early in the fall and if the species is of the pistillate kind, the catkins, falling on the sidewalk, become a danger and a nuisance to pedestrians. The silver maples are constantly full of dead wood, are subject to boring insects

and are short-lived. The sycamore maple is a favorite of boring insects in the vicinity of New York, though in other places it has escaped these pests. The variety of ailanthus tree that bears the male or staminate flowers generates a strong, rather oppressive odor, but if the pistillate form is chosen, the tree will produce a beautiful head and grow in places where no other tree will grow.

Such are the principal problems of those charged with the care of street trees. I have not attempted to dilate on the details of the work because they are too numerous and because, as in everything else, their solution will often depend more upon the judgment of the forester in charge and upon the local conditions than upon any rules that may be laid down. But, whatever the problems, do not let us forget that they can always best be solved by one equipped with technical knowledge and experience, and that the trees are worth the effort since they are always valued by the citizen and ultimately lead to a better appreciation of all other forms of civic improvement.

MOVING LARGE TREES

SUPERINTENDENT C. L. BROCK, of the Park Department of Houston, Texas, sends the accompanying photographs of some trees that he moved recently with successful results. Main Street of Houston is being widened into a wide boulevard and it was necessary to set back many of the trees to make room for



MOVING LARGE TREES

Each tree, most of them large ones, on a line along which stands the tree in this photograph, was moved close to the wall on the left, at Houston, Texas. Out of 215 so moved, only three died.

the pavement. In all, there were two hundred and fifteen trees to be moved. These are live oak (*Quercus Virginiana*), as no other trees are planted on the street. Most of the trees were moved from three to fifteen feet and a few, fifty and sixty feet.

Considering the time of the year,—the moving was in June and July,—it was a somewhat hazardous task



BALL OF EARTH ON TREE BEING MOVED

In moving trees to widen a boulevard at Houston, Texas, particular care was taken to keep each in as large a ball of earth as possible, and, as a result, the transfer was most successful.

to move them, but to date only three have died from the effects.

Many of the trees are putting out sprouts and with plenty of water should live and do well. A ball of earth weighing from two to ten tons was moved with each tree.

QUESTIONS AND ANSWERS

Q. Is there anything further to be done for five clumps of apparently thriving pin-oak forest trees, in a Jersey suburb? The soil is clay. Shall be glad of any suggestions.

H. W. C., *Montclair, N. J.*

A. Pin oaks will readily respond to heavy fertilization with well-rotted manure and leaf mold. You will do them a lot of good if you will, in November, dig in some of this fertilizer, and, in the meantime, see that all old wounds are freed from decayed wood and properly covered with coal tar.

Q. Can you advise me as to what trees to plant on a piece of ground—67 acres—I have just bought with the object of making a summer home. We are located in central West Virginia and the land is all sloping hillsides, sandy soil. I want some quick growing trees for near the house and some ornamental and nut trees. Would oriental sycamores be good for this location for quick growing shade?

C. C. J., *Clarksburg, W. Va.*

A. Oriental sycamore trees are very desirable for your purpose, around the house. The American and European lindens, the red and pin oaks, the Ginkgo, sweet gum and tulip tree are a few others of the shade trees. The English walnut, pecan and "Sober Paragon" chestnut will be suitable for nut trees, and the white pine and hemlock for groves of evergreens.

Q. The honey bees have been attacking my catalpa trees severely. They seem to get on the main part of the leaf and suck all the sap out of the leaf till it falls to the ground. Can you tell me what to do?

M. A. C., *Cranford, N. J.*

A. We have never heard of honey bees doing what you say, but there is a little green fly which, during the month of July, feeds on the under side of catalpa and Norway maple leaves, causing them to drop prematurely. These flies produce

NEWS ITEMS

A special meeting of the American Academy of Arborists was held recently at the Zoological Park, New York City. The meeting was full of interest and enthusiasm, with plenty of field observation and discussions of recent important problems in arboriculture. Papers were presented by Messrs. Maxwell, Smith and Robson, and a very profitable trip was taken along the Bronx Parkway which is now in course of construction. Mr. Merkel, chief forester and designer of the parkway, surprised the members with the enormous and intricate problems of the undertaking. The next annual meeting will be held in August, 1917, at Washington, D. C.

ADVICE FOR SEPTEMBER

1. Prune all dead branches of importance. Do not prune unnecessarily; prune as little of the live wood as possible; make all cuts close to the trunk or main limb and cover all wounds with coal tar.

2. Remove and destroy egg-masses of the tussock moth and similar leaf-eating insects.

3. Mark for removal in winter, all hopelessly infested and dead trees. You can discern these trees with greater definiteness before the leaves drop, but you can cut them down to greatest advantage in winter.

4. Plant evergreens during the latter part of August and early September. Move them with a ball of soil.

a glossy, sticky honey-dew, and perhaps you have that in mind. Spraying the affected leaves with whale-oil soap, one pound to ten gallons of water, will destroy the insects.

Q. On my camp, here in the Adirondacks, I have a very fine white birch, which, about ten feet up on the trunk, has a large open break. I believe such trees can be doctored. Can you kindly refer me to a place where I can get the stuff which is put into such trees?

J. C. F., *Long Lake, N. Y.*

A. I am sorry to hear of the condition of your white birch. It seems to me that the first thing to do would be to secure the break at its upper and lower ends by bolts. The bolts should be provided with nuts and washers embedded in a groove under the bark. When the split is thus bolted, it may be left open, and so cut that the water will drain off. The interior of the break should be thoroughly covered with creosote and tar in mixture. A filling of cement will then not be necessary and an "open wound" will serve the purpose better. If you prefer to close it, however, ordinary stone or brick in mixture would answer for this purpose. I enclose a little leaflet which will give you full instructions.

Q. On a pink horse-chestnut tree, seven feet high, planted two years ago, the leaves suddenly turned brown and the fourth day fell off the tree. I sent for the horticultural expert, who dug to the root, found it mildewed and partly rotted, lifted up the tree and threw it away. An oriental plane tree nearby, nine feet high, showed the same condition, was pulled up and thrown away; the plane tree had not properly leaved out. Could not these trees have been treated and saved?

H. J. W., *Los Angeles, Calif.*

A. It is a little hard to tell, without seeing the specimens, whether those trees really had no more chance for life, or whether their buds were still intact and capable of development. Perhaps the roots, as a result of poor planting, stagnant water or

sewerage, were so badly injured that your advisor considered them useless and therefore impossible to be treated. It is generally wise in such matters to determine the exact cause or to send a specimen from the tree in to us for examination. In case of doubt it is generally a good plan to cut the branches in a bit and give the tree another chance.

Q. When is the best time to plant poplar trees, what kind shall I plant, and how shall I plant them?

F. J., *Scarsdale, N. Y.*

A. The best time to plant poplar trees is early spring, though it may also be done in the fall.

The species to choose must depend upon the purpose. The Carolina poplar is best of the poplars where shade is desired. The Lombardy poplar is best suited for æsthetic and avenue effect.

The principal thing to remember in planting poplars is to cut them back hard. They will then thicken out better and grow more vigorously. In other respects the planting of poplars is the same as that of other species.

Q. What is the "cedar apple" and what does it do?

M. J. K., *Freehold, N. Y.*

WHO PLANTS A TREE

JOHN GREENLEAF WHITTIER'S poem for the agricultural exhibition at Amesbury contained this verse:

Give fools their gold, and knaves their power;
Let fortune's bubbles rise and fall;
Who sows a field, or trains a flower,
Or plants a tree, is more than all.

More men are planting trees. With clearer vision, large wealth is finding services that look to the long future and the common good. A country boy loved a big hill near his home. He went forth and made a fortune. He has bought the hill and on its slopes he has planted 50,000 trees and shrubs. Thousands visit it.

Less than fifty miles away a man is planting forty acres in trees a year; so far he has planted 320 acres; he is beautifying a mountain-side. He came from a family of foresters in Germany; love of trees was born in him, and this is his tribute and his token to America, which has made him rich. A score or more of individual forestry operations are in progress.

Where is the personal return? A case will give the answer: Seventy years ago a lover of trees did much planting on his fine estate on the outskirts of Baltimore. He brought new kinds from different parts of the earth. In 1860 he died and Baltimore bought the estate, and this became the renowned Druid Hill Park, whose tree beauty has been more written about and illustrated and praised than anything of the kind in America. What is the point? This: The name of the man who planted the trees is emphasized in local history. Other notabilities of his day are forgotten. He bought living fame by planting trees.

Often Wealth says: "I'll not wait. I want quick returns for my money." And he puts up a hotel and names it after himself, or a whale of a house in which he is lonesome. If Wealth is wise he says: "I'll put it where it will grow." And when he plants trees it grows into blessings.

Surely there is something noble and uplifting in the company of trees. And the good of it grows whether you plant a single tree or a mountain-side.—The Country Gentleman.

A. The cedar apple is a fungous growth appearing early in the spring in the form of a brown, apple-like growth on red cedar trees. It uses the cedar trees as temporary hosts for the winter, but really does its damage as a fungous blight on neighboring apple trees and hawthornes.

Q. When shall I spray my red cedars for red spider and with what?

H. H., *Philadelphia, Pa.*

A. Spray in early May but also examine the trees during June and July and spray them if you find it necessary.

Use whale-oil or fish-oil soap at the rate of one pound to ten gallons of water.

Q. Where will rhododendrons and laurel grow best?

J. B., *Brooklyn, N. Y.*

A. Under the shade of other trees and in rich, deep soil.

Q. Do you know of any machine used in the nursery trade for the counting and tying of trees?

D. H., *Dundee, Ill.*

A. We do not know of any such machine.

VERMONT FORESTRY MEETING

THE Twelfth Annual Meeting of the Vermont Forestry Association was held at Lyndon on Wednesday, August 2nd. In the forenoon an inspection was made of the State plantation of Scotch pine, which was made in 1912 on shifting sand. The experiments carried on here with sand binding grasses from Cape Cod and with open fence, such as was recommended by the Department of Agriculture, were of much interest to those present, as well as the planted growth of Scotch pine. Mr. Charles Darling, fire warden of Lyndon, entertained the members and their friends at dinner served at "The Old Brick Tea Shoppe," Lyndon Corner. Immediately following the dinner there was a meeting of forest fire wardens of Caledonia County, addressed by A. F. Hawes, state forester, and L. H. Bailey, entomologist. At 3 P.M. the Forestry Association held a coöperative meeting with the "Lyndon Home Project Club." Mrs. Chase, the originator of this Club, developed a very interesting program in which several boys of the locality gave short talks pertaining to forestry. Other speakers were Roderic Olzendam, secretary of the Association, and Amos J. Eaton, who closed his remarks with selections from Drummond's French-Canadian dialect poetry. In the evening there was a joint session of the Vermont Forestry Association and the Vermont Timberland Owners' Association, at which there were addresses by Hon. T. N. Vail, president of the American Telephone and Telegraph Company, Hon. H. F. Graham, state auditor, W. R. Brown, president of the New Hampshire Timberland Association, A. F. Hawes, state forester, and James P. Taylor, secretary of the Greater Vermont Association.

At the business meeting the following officers were elected: president, Ernest Hitchcock; vice-presidents, Theodore N. Vail, Redfield Proctor; secretary and treasurer, R. M. Olzendam; executive committee, Allen M. Fletcher, Frank Plumley, James Hartness, Amos J. Eaton and A. F. Hawes.

Conservation of Our Forests

Extracts from an address to the Vermont Forestry Association

BY THEODORE N. VAIL

President, American Telephone and Telegraph Company, and Vice-President of the American Forestry Association

CONSERVATION has been much used and much abused in connection with our national resources.

It is a big, open question how best to serve the present necessities of man and yet have proper consideration for future necessities. If you are thrifty, you conserve fruits and vegetables and other products for your future use, but you only conserve articles particularly intended for that purpose, or the surplus above your present needs. That is what should be the teaching of conservation—how to use without waste our natural resources for our present needs, and protect and conserve the rest for future use. When the present needs are in conflict with our real or conjectural future needs, we must decide in favor of the present demands, or those of the near future.

Conservation, as applied to forestry, is a question of location or environment and local conditions. In Vermont it is not waste to burn up the small branches of the fallen trees; fuel is too plentiful and too cheap and labor too expensive to prepare them for

use; yet, in some parts of the world it would be wanton waste not to save for use for domestic purposes every last stick and twig. It was not waste for our pioneer fathers to make a slash of the timbered sides of these Vermont hills and burn it to clear the land for agricultural purposes, because the wood encumbered the ground and was an obstruction to settlement; but now

if you wanted to clear a piece of timber for cultivation or pasture, you would not do it that way. It is not waste or wanton destruction to clear woodland to the last stick, if you protect the new growth for future use. Our timberland must now be treated the same as any growing crop—planted or be allowed to plant itself, protected and harvested at maturity, and our shade trees

must not be held too sacred to remove when they become a nuisance instead of a pleasure or a benefit.

Much is talked about conservation in connection with the freshets of spring and dwindling of our streams in summer. Many of the things which some think due to lack of conservation are the inevitable sequence of cultivation and settlement. Timberland cut over but not burned over, if the new growth is protected, or timberland of growing trees, will practically protect the streams as well as if the old timber was left standing. Uniform streams throughout the year never have existed, and to make them would require reservoirs to catch all above the average flow and to

hold it to use as needed. The tangled, mossy, fibrous ground of the primeval wilderness and the valley swamps caused by fallen timber and luxuriant weed growth acted as reservoirs and did maintain a more uniform flow than we now have, but they did not prevent freshets when the warm spring rains came on a great depth of snow laying on frozen ground, or when a big downpour fell



THEODORE N. VAIL

President of the American Telephone and Telegraph Company and Vice-President of the American Forestry Association.

on fully saturated ground and swamps full of water—but who wants to restore that condition? Cultivated fields will not absorb as much water as forest bramble. There will be more soil washed away from a plowed field than a meadow or forest, but of what value would the forest be if there were no cultivated fields to support the people who create commerce, build cities, and what use or value would there be for forest products? Of what advantage is it to let timber that is valuable stand and deteriorate?

Much has been said about the wanton destruction of the forests in the West on lands which were not at the time necessary for settlement. If it had not been for cheap lumber in the West during the last half of the last century, there would have been more hardships, more difficulties in the settlement and subjugation of that vast country. The plains were timberless except the few trees, worthless for timber, on some oasis, or fringing the larger creeks or rivers. Cheap lumber brought from other points was a necessity to build the shack or shanty shelter of the pioneer in a stoneless country and to fence the fields before the day of barbed wire.

Cheap lumber has been a great factor in the upbuilding of our country, and cheap lumber must mean careless and wasteful methods of lumbering because you must take only the best and easiest to get.

While past methods here and present methods in some environments and under some conditions have been and are justifiable, there is no justification or excuse for the continuance of some of those methods. So long as the bad effect of any method is overbalanced by the benefit to the community, then that method is justifiable. When it ceases to be more beneficial than harmful it should change. That time has come when many improved methods can be adopted to the advantage of all, and whatever you expect to be adopted must be of some advantage to the state and to the community, and it would be a good business proposition, to reforest and protect all the hills not utilizable for other purposes.

IT is useless to advocate the general reforestation of our hills as a work of the small individual owner or farmer in any large way for many reasons. Wherever land is more valuable for any other purpose, it would not be reasonable to expect it; where it would be profitable, few of the dwellers on the hills have the capital to invest in the planting or are able to carry the plantation for a prospective profit fifty or sixty years ahead, and even if they had the capital it could, as a rule, be used to greater immediate advantage.

Reforesting and conservation on a large scale is a state proposition, or a proposition for large timber-using corporations. A corporation, which is a perpetual individual, could well afford to replant where necessary or allow it to reforest itself to such an extent as would cover depreciation, or restore current exhaustion, and in this way provide for future needs. This is now being done by many pulp and other like companies for the annual supply of ties.

The farmer, the individual, can conserve in a small way on his wood lot or sugar orchard, or can even reforest by using his otherwise idle moments and in this way capitalize them. In a small way each can conserve and protect, beautify and improve his surroundings, while at the same time supplying his present needs and providing for the future. Such a policy, consistently followed, in a few years will surprise you by its extent and magnitude. Clear up the brushwood to give the new growth a chance to grow, cut and trim out the matured and surplus growth, so that it will not be using the soil food that should go to the other trees; protect your own lots and help protect your neighbor's from fire.

Cultivated fields and light-soiled pastures should be protected from unnecessary washing or gullyng so that as little soil as possible is carried off to fill the brooks or make some delta thousands of miles away. All that is needed is a little common sense, thinking and observing and doing what is necessary to be done when the need is first noticed. Every one of these sand wastes we have around here started first from a break in the soil and could have been stopped before any considerable damage was done.

Each farm has its peculiarities. A little thought and study will determine how many of these new notions or how much advice coming from all sides is of benefit or can be made use of, but one must first have full information of what has been done and what is being done. It is just as foolish to consider any proposition, without knowing what is going on, as it is not to consider it at all, or to blindly follow every latest fad, or to stick sullenly and blindly to old-fashioned ideas.

ANYTHING will come out all right if it is approached from a practical standpoint, and brains and experience and, above all, observation are used. Know what is going on; follow the good and discard the bad.

If reforestation and conservation on a large scale is the work of the state—how is it best to go about it?

Vermont, with its beautiful vistas of hills, valleys, lakes and streams, or its broad panoramas, with distant background of superlative landscape, will always be sought by those in search of vacation and recreation.

There are wilder, more majestic and sublime or awe-inspiring sections of the country, but none more beautiful in its combination of cultivated and rugged variety. The greater the development, the greater will be the beauty and the possibility of that reposeful enjoyment which so many prefer to imposing grandeur.

Certain states, as well as the United States, have established reservations for conservation and preservation purposes.

The hills and mountain-valley streams of Vermont were once and should be the home abiding place of all kinds of useful wild life.

Burned-over mountain-sides and sawdust have dried and filled up many of our streams. Illegal hunting and fishing have done the rest and have virtually destroyed

the fishing and shooting and are retarding all attempts at restoration. From both the æsthetic and practical standpoints, all this should be remedied. It can be done, to a certain extent, by rigid enforcement of proper laws and the repeal of laws made for effect only, not to be enforced.

If the State should establish several reservations, which should include the head-waters of our rivers, and re-establish and protect upon the hills the natural timber growth, make some improvement in the course of the streams, and protect these reservations absolutely from all kinds of depredation and destruction, it would in time restore all that Vermont once had, with all the additions which time and experience have proved to be useful. These reservations would be the nurseries of game and fish for the lower streams and valleys.

It would benefit the State both as a place for habitation and resort. It would be a source of large profit to the State from an actual return in money derived from licenses for fishing, hunting and from sale of lumber, while the indirect return would be almost beyond estimate. Vermont is well able to make the original investment of capital which would bring ample returns in enjoyment and pleasure and add so greatly to the prosperity of the State. All men filling the high public offices like some great reform or beneficial movement to mark their term. Here is an opportunity for our next governor to hand his name down to future generations.

TO aid our industrial development, reservoirs could be established at natural points, and in this way preserve the lower river reaches from excessive floods and establish that equable flow of water in the streams which is so necessary to industrial development.

There are many details to be worked out by actual experience. Only a general idea can be presented. There are no impossibilities, while the probabilities, æsthetic, industrial and financial, are great.

To make any such movement a success, no one individual, either by careless or intentional disregard of the rights of others or of law, should be allowed to destroy, by disregarding regulations and laws, that which was being done for the benefit of all. There is too much indifference to, and toleration of, the selfishness of individuals, which allows them by encroachments, small and large, upon common rights, to make impossible the full enjoyment by other individuals, or by the public as a whole, of their rights. It is time we stopped talking about that independence of the individual, which is in effect only surly self-indulgence and egotistical self-assertion and a bad excuse for bad education and bad breeding.

Accessibility and easy access and intercommunication are important factors in the development of the country for any purpose.

We should so foster our ways of communication leading in and out of our State that the coming and going can be made pleasant, comfortable and available.

We should see to it that our intra-state ways of intercommunication are the best possible, and, to show the

best in our State, some should be purely scenic roads, coursing the ridge poles of our beautiful country. We are beginning to have a very perfect road system, but we must remember that we not only need to build roads but to care for them. The best made road begins to deteriorate the moment it is finished and the motor, pushing itself along by its wheels, finds the weak spots and unless attended to there is trouble for the road and discomfort, if not danger, for the user.

Eternal vigilance is the price of good roads.

If, in our striving for what is best for our State, we give first thought to its desirability as a place to live and get a living, with favorable and desirable environments and conditions, we have gone a long way towards making it even more desirable for the outsider, for the visitor.

It can be done without disturbing our comfort or our ease. It can be done with profit to ourselves and with little or no additional labor, if we only make effective every bit of labor we do.

We don't want to make Vermont the Switzerland of America, but we want to make it the Green Mountain State of America, unique and, of its kind, incomparable. We want to develop its natural charms and resources. We want to make it so attractive that it will hold its young people here and bring the absent ones back. We want all the world to come here and play with us, and all that can, to come and live with us.

WHITE PINE BLISTER RUST QUARANTINE

Governor S. V. Stewart, of the State of Montana, has ordered a quarantine against the importation of any five-leaved pines, currant and gooseberry bushes from the States of New Hampshire, Vermont, Massachusetts, Connecticut, New York, Pennsylvania and known infected areas in other localities suspected of harboring the white pine blister rust.

All quarantine guardians and deputy state horticultural inspectors have been instructed to refuse admission into Montana of any shipments of nursery stock of five-leaved pines, currant and gooseberry bushes from the above named states and to immediately deport such shipments or destroy them by burning.

THE government will soon ask for bids for 330,000,000 feet of government timber on the Oregon National Forest, much of which is Douglas fir. A strip of timber will be preserved for scenic effect along the projected road through the forest reservation.

WASHING logs for safety's sake is the manner in which a western camp follows out the new economic principle of "Safety First." The logs are scoured by jets of water, to remove broken stone, gravel or other such material, which might, if struck by a swiftly revolving saw, cause the saw to explode and bring death or injury to workmen.

HAVE YOU NOMINATED A FRIEND FOR
MEMBERSHIP?

Address by President Pack

[Following is the address of Charles Lathrop Pack, president of the American Forestry Association, at the Southern Forestry Congress, at Asheville, N. C., recently. Mr. Pack lived for some years at Asheville and his reminiscences of that city and surrounding country, thirty and more years ago, will be of particular interest, not only to the present residents, but to thousands of people throughout the country who know Asheville and love it.—The Editor.]

I CANNOT tell you how gratified I am to be back here in Asheville. The first time I stood on this spot where I am standing now was in October, 1883. There was no Battery Park Hotel at that time, but there was this beautiful hill and the grand mountains—old Pisgah and the others were here just as they are now. And Asheville was here with, I think, about fifteen hundred people. There were no pavements on the streets; there was hardly a bank in town. I recall shortly afterwards, when my family came here to make their home, their life home, and about that time my father, George W. Pack, purchased the property which is now known as Aston Park. Very few of you ever met that grand old gentleman, Mr. Aston, one of the best assets this town ever had. And when it was found that the owners of the property would take \$7,000.00 for it, the question arose as to how to get \$7,000.00 to Asheville, and so I was sent North and brought the \$7,000.00 to this place in a suitcase, largely in one and two-dollar bills, and the largest bill was \$5.00. The money was paid over, and my father and myself had the satisfaction of seeing the money go into circulation down here. And over there on the public square, often towards noon-day we would stand together and question each other as to whether Colonel So and So, or Major So and So, had received any of the money yet, and I assure you we could tell how fast it circulated—see it circulate—because the men with the money stood up straighter and walked faster. The land was later presented to the City of Asheville by my father and named Aston Park.

I could tell you many interesting things in regard to those early days in Asheville. Our family were the first Northern people to come here. The grandest hotel in town was the Hotel Swannanoa, and when I came here they charged a dollar a day and changed the table-cloths once a week. And Mr. Ruben R. Rawls, who is still living, was astounded when he was offered \$2.00 a day for five people if he would re-paper the bedrooms and have a little better food. And about as soon as he got the house re-papered, other visitors from the North began to arrive.

I became greatly interested in these mountains, where nature has done so much for man. I recall about 1885 or 1886 going up the Pigeon River (some of you have been up there, perhaps, fishing in the Smoky Mountain region) and staying with a moonshiner. Theoretically, of course, there is no moonshining in North Carolina; practically—well, we don't talk about it. But I stayed with this moonshiner. We arrived about noon and he invited my friends and me to dinner. We had roast suckling pig and broiled guinea fowl and fine corn-bread and good sweet-

potatoes—the table fairly groaned with the good things of North Carolina, and there is no state where there are more good things than right here. And after dinner we were taken out, down the gallery at the side of the house, and he opened a little door and wheeled out a keg on to the veranda. He then passed around little baby gourds, and said, "Gentlemen, help yourselves." Well, that was corn whiskey, about as clear as water and nearly all alcohol. Well, I was doubtful about the results, and when nobody was watching me, I tossed the gourd full of whiskey on the ground behind a veranda post with a clinging hop-vine. I thought I was unobserved, but a little fellow, about four years old, in a yellow slip of homespun, came pattering along the veranda, and ran through the gangway calling out, "Grandma, the little fellow can't drink as much as Mama."

IT is a great pleasure to me to bring to you the greetings of the American Forestry Association. Some of you, perhaps, do not know about the American Forestry Association. It has members in every state and territory in the Union, including Hawaii and Porto Rico and Alaska. It has thousands and thousands of members. Perhaps you will permit me right now to tell you that in the last five and a half months over 2500 people have joined, paying \$3.00 to \$100.00 apiece. It is an American association that stands for all that is best in forestry, and I bring you the hearty greetings of the Directors of the American Forestry Association, wishing you God-speed in the splendid work you are doing.

I think, as Forester Graves told you, that there is no part of the country that needs scientific forestry more than the Southeast, and I do not know of any part of the United States where forestry, properly conducted, can do more for its people than it can in this region. And you will do well to organize in every Southern State a forestry association, or at least a fire protection association, so that you can get your equitable share of the money for fighting forest fires, and preventing them, that is appropriated annually by the United States Government for that helpful work which the Government undertakes in coöperation with the states. Many of the Southern states have received none of that money, and therefore have none of the benefits, simply because they are behind the times. I have lived for the last fifteen years in New Jersey. I know some of you, who live in a part of the country where you have more blessings, don't think that New Jersey is even a part of the United States, but be that as it may, we are a great State in many ways. Forty per cent of the area of New Jersey is in forest. Some

people think of us as raising politicians and . . . other sorts of agricultural products, but we raise timber, also, in New Jersey, and we have a forest fire system which I think is second to none. As Forester Graves can more fully explain, we receive, through his department, help that comes through appropriations in connection with the Weeks Law. This is a benefit received every year, and it is in that connection that we realize we are a real part of the nation.

THERE are a great many forestry questions coming up that are of interest and importance. You all know something about the great destruction of the chestnut that has taken place in the East—the so-called chestnut blight. Up in our part of the world—New Jersey—and in some other states, you rarely see a chestnut tree that is alive. When you look off across a wooded country, you simply see the skeletons of the former chestnut trees standing in the air, in most cases without bark. The ravages of the chestnut blight were not stopped, and now, people of North Carolina, you have the beautiful five-leaf pine—white pine, as we call it—and you want to look out, because there is another great scourge, and that is the five-leaf pine blister rust. It is all over New England and elsewhere and spreading rapidly. It got a big start before the scientific men spoke out loud about it. You must be wide awake to the danger or you may soon have only sick or dead chestnuts and sick or dead white pines to look at.

I saw a forest in Massachusetts the other day, coming down through Lenox, beautiful white pine trees, such as you see in some parts of Western North Carolina, and the greater portion of them were infected with this terrible blister rust pest. You will want to be organized in every state in the mountain region for many reasons, but you particularly want to hurry up your organizations so you can properly face this danger. There are other men with greater technical knowledge than I have who will talk about this white pine blister rust at this Congress. But I beseech of you not to underestimate the importance of this terrible calamity which threatens us with the possible extinction of the white pine.

Now, gentlemen, there are a great many things I might talk about, but you have many more experienced speakers than I—people who have a live message and, therefore, I will say only a few words more. The forests of America are increasing in potential importance, particularly on account of the great war. Do you realize that in Russia, in the Balkans, in Belgium, in Galicia, in France and England—everywhere—there is terrible destruction of forests? For now on the battle-fields, where whole forests have been felled, there is much the same scene of desolation as some of your mountain-sides used to have when the tobacco crop farmers deadened the trees. But that is not all. England and France formerly imported a great deal of their lumber from Russia and the Rhine, and they are now cut off from that source of supply. The ocean freight is so high and the shortage of ships so great that a comparatively small amount of lumber

has been shipped to England and they are cutting down the fine old picturesque woodland parks over there. One of the most picturesque, as well as the saddest, things of the war is this: there was organized in Canada a body of woodsmen—2500 men or more. Some of them months ago paraded the streets of Ottawa clad in khaki trousers and Mackinaw shirts. They carried saws and axes, or peveys or canthooks, in addition to fire-arms, and those 2500 men have been taken to England—they are there now; and what are they doing? They are cutting down the historical old forests of England because England has to have the timber for mine props and for other necessary things, on account of the terrible shortage of lumber and wood at this time in England. What will England look like when you and I go back there after this great world-war is over and find that the forests have been cut so that we cannot recognize them? I received word only Saturday last from one of those Canadian men who is working in the south of England, in the forests, and he was permitted by the censor to send a letter to me. He said, "Really, my friend, we men of British Columbia, who have been used to cutting down the forests of Canada, really feel sad to cut down these magnificent park and shade trees, but such is war."

NOW, all this has a great relation to the forests of the United States. I do not need to tell you that the potential value of our forests will be greatly increased by this terrible destruction of timber and the uses for lumber that will come after the war. So it is important that we think more of our forest reservations—more of the great heritage which we should leave to posterity, and we should take care of these estates of the people which mean so much to us, not only from a financial and economic standpoint, but from other standpoints. You, here in this region, have been greatly blessed because you live so near to nature. And I think every one of you will agree with me that the frequenter of the woods, the American forester, the man or woman who can climb these hills and see these grand products of nature, and all true frequenters of the woods, are men and women of artistic feeling. The tree has ever been the symbol of life, strength, beauty, and the eye of man cannot continue to look upon these monuments of nature without their beauty being reflected in his life, making him a happier and a better man, and their destruction, ladies and gentlemen, means not only the removal of one of our natural resources from a practical and utilitarian standpoint, but also from the viewpoint of morality, of happiness, of beauty and of spirituality. And I am sure you agree with me, that there is no compensation for such a loss. I thank you.

The annual value of the farm woodlot products of the United States is over \$195,000,000.

MORE people spent their vacations on National Forests during the summer than have ever done so before, many persons traveling long distances by automobile in order to camp in these public playgrounds.

Forestry for Boys and Girls

by Bristow Adams

The Wooden Horse - But What Wood?



WHAT kind of wood was the Trojan horse made of?"

"What kind of what?" I said, looking up from the newspaper, in response to the ten-year-old's query.

"You know; the wooden horse that the Greeks got into, and then the people of Troy dragged it inside the city, and the Greeks got out and captured 'em."

He was looking at a set of books that I bought because it was advertised to answer every question a child could ask, and therefore seemed a good thing for our family of four children. So far it seemed only to suggest new subjects about which questions could be asked. This Trojan horse idea was a fair sample. It showed at once that I did not know more than the twenty volumes contained. Not that I minded any such little thing as that myself, but it seemed to disgust the children so much, and to give them such a poor idea of their father.

Maybe old Homer tells somewhere what kind of wood it was; if he does I have forgotten it. It was always just a wooden horse to me and no more. I thought it might have been pine because pine is easily worked; in this case, however, it seemed to all of us that the Trojans were the ones who were easily worked. Then we got to discussing the fact that to most folks wood is just wood.

Yet every kind of wood is different from all other kinds, and even trees of the very same kind will give different sorts of wood. I have seen two pieces of Cuban pine, one of which was twice as heavy as the other, and of a much darker color. It grew more slowly, had more pitch, its annual rings were closer together; almost anyone picking up the two pieces would have said they came from trees entirely different from one another.

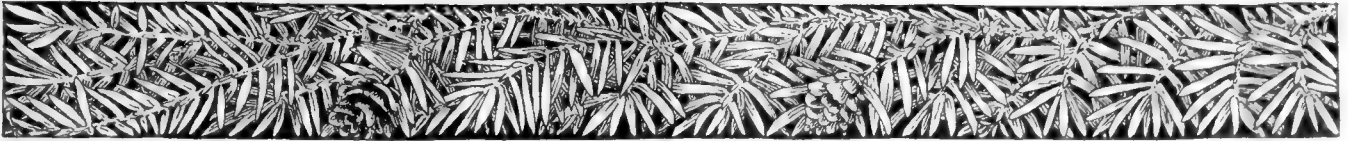
THROUGH thousands of years certain woods have been recognized as best suited to certain uses. In the main, these have been the right uses for the woods, but people got so set in their ideas that they thought no wood, other than the one they had long been accustomed to, would do for a particular purpose. Now we are finding out that little-known or little-used woods are just as good as the time-tried ones.

At the same time it must be granted that for some woods there is nothing else "just as good." Hickory is one of these, and nothing does so well for the handles of tools that strike, such as hammers, picks, and axes. It is elastic and tough, and will stand shocks which would shatter handles of other materials. For the same reason it is the exclusive wood for golf sticks; were it not used the amateur golf player would have even more excuse for bad words than he now has when he hits the ground instead of the ball.

The driving heads of wooden golf clubs are made of persimmon or dogwood because these are hard and heavy and will stand knocks without being splintered or badly dented. For the same reason they are chosen for making bobbins and shuttles in the cotton mills. These are thrown back and forth, through the warp of the cloth, hurled by steel, striking against steel, and being hurled back again. Other woods have been tried, and none of them lasted long enough to make their use worth while. It can be truly said that they are the only ones which will "stand the racket."

PENCILS are always made with that nice smelly wood like the big drawer in mother's clothes-press," chirped up the youngest, who ought to know about pencils, because he manages to make away with most of mine. "I like the taste of it too," he





added. There is no doubt that he knows the taste, since the pictures which he draws are very, very black, and he needs to sharpen his pencils often. He does this sharpening with his teeth, like a squirrel.

The "smelly" wood in lead pencils is red cedar, or red juniper, and is about the only wood that is used for pencils. It is made into pencils very easily because it has a straight smooth grain; but the real reason for its use is that most folks carry a dull pocket-knife, and red cedar is the one wood which can be whittled by a knife which is said to be "so dull it won't cut butter."

Red cedar is also a good wood for fence posts and arbors and garden furniture. It contains an oil that helps it resist decay. This oil gives it the pleasant odor, which caused the little lad to designate it as the "nice smelly wood."

Cypress also is noteworthy for resisting decay; other woods that make good fence posts because they do not rot out soon are locust, chestnut, catalpa, sassafras and osage orange. The main trouble with osage orange is that it seasons so hard that one can hardly drive a staple into it.

EUROPE'S great war calls attention to many special uses of wood. One of the most pitiable results of the war is the call for willow to make parts of wooden arms and legs. It is strong and light, and tough. Aéroplane frames are almost all made of spruce, not only because it is stronger for its weight than other woods, but because it is so free from flaws and hidden defects. The very life of the air-man depends on this quality.

Aéroplane propellers are made largely of black walnut, sometimes glued in strips with spruce and ash. Warplanes are the most likely to have all black walnut propellers, because the wood holds its shape, is strong and even-grained. There is no way the propeller can be protected, because it must have all the air it can get to push against. But if a bullet hits it, the wood does not crack and splinter; there is only a small clean hole. For somewhat the same reason black walnut is practically the one wood used for gun stocks; the woodlots of the

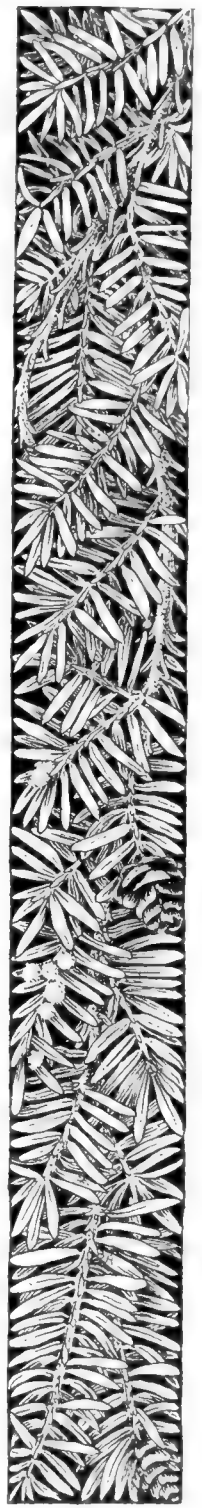
central hardwood states, and even old gate posts and buildings are being stripped to supply the armies in France and Russia.

The decks of battleships are made of teak because it stands wear, is hard and strong, but mainly because water does not affect it. Its chief quality is that iron bolts, spikes, or rings set in teakwood do not rust out from the moisture held by the wood itself. The surface of teak always seems oily, and once it becomes seasoned or dried out, it does not readily take up water again. Like black walnut, it does not splinter when struck by shot or shell.

MANY others can be mentioned; if one set out to make a list it would be a very long one; boxwood for wood-engravings, spruce for violins, because its fibers carry tones so well; spruce also for pulp from which paper is made. Rugs, furniture, pulleys, buckets, cloth, and all sorts of things are now made of wood by way of pulp.

THESE odd uses of wood have a real bearing on the work of foresters, because the forester must know how to grow the kinds of woods that are wanted, and to keep out of a well-managed forest those trees which do not furnish useful lumber. Such poor trees, therefore, are like weeds in a field of good grain; they take up room and are not worth the room they take. Foresters may go even further than that, to make individual trees grow so that they will suit special uses. Hickory and chestnut grown rapidly from sprouts furnish the best material for the peculiar uses to which these woods are put.

BY side-tracking them from the Trojan horse I thought I had been able to make them forget the first question; but that is a trick that all children seem to see through, and I finally had to own up that I did not know any more about it than they did. Then I told them that my newspaper was made of wood, and left them busy hunting for the ground up splinters and fibers that showed in the unprinted margin. They had their piece of newspaper and I had my newspaper in peace.



How To Tell the Age of Trees

TO TELL the age of trees is always fascinating. The best test is to count the annual rings on a cross-section of the stem near the ground and add to this number as many years as it took the tree to grow to that height (see the two lower series of drawings in the plate).

A second test applies to such species as white pine, which develops lateral branches in distinct and rather regular whorls (see white pine in illustration). Each whorl normally represents a year's growth. If the branches have fallen off, the scars of the branches may be seen on the stem.

The age of young trees or small branches can also be determined by counting the rings of terminal bud-scale scars (see upper left hand figure). The portion of the branchlet, from the end down to the first ring of bud-scale scars, represents the last season's growth, while that between the first and second rings represents the next to the last season's growth, and so on.

After you have been successful in determining the age of a few trees you may find yourself questioning the age of others as you walk or drive by them. A careful study of their growth will often indicate the successes and

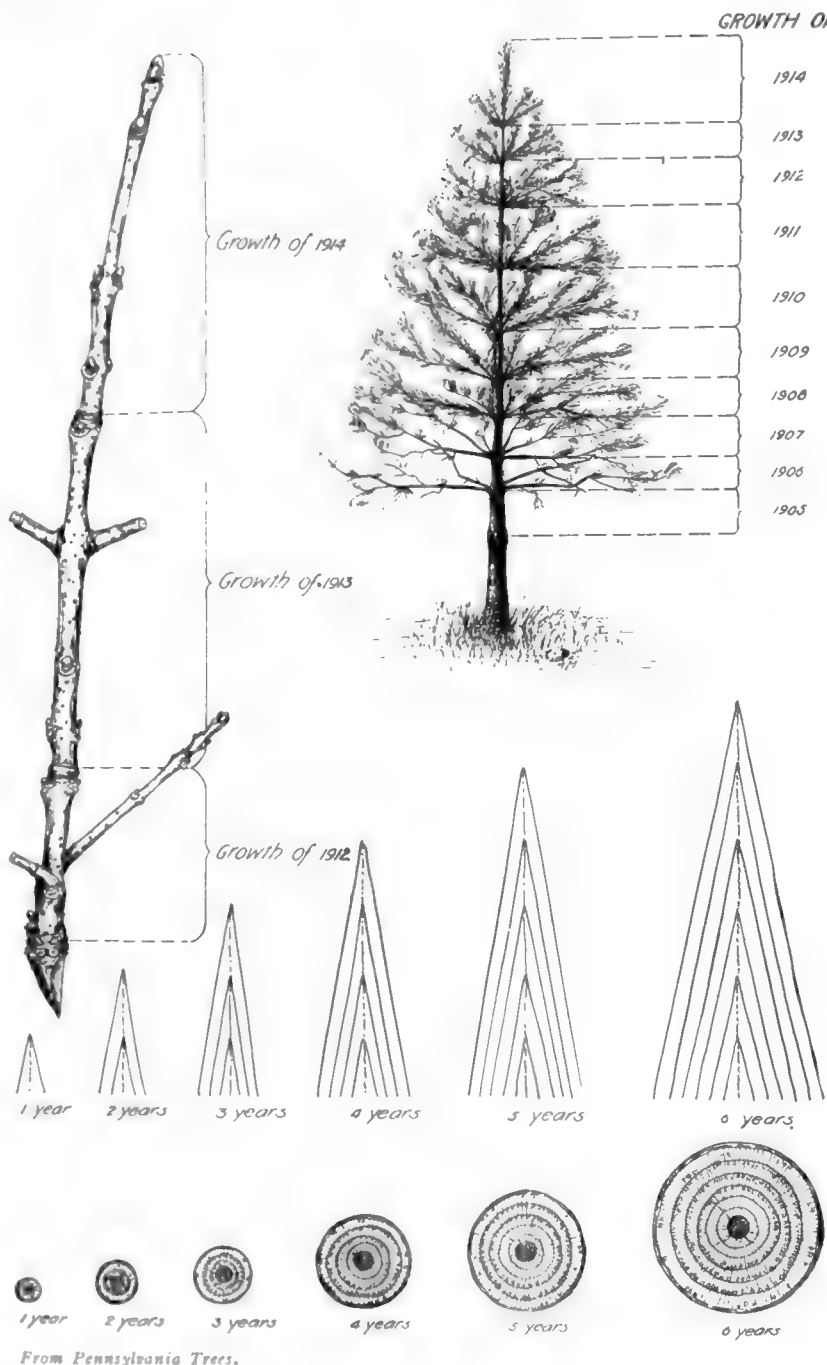
failures which they met during their development, since a relatively narrow ring often indicates a struggle, while a wide ring often indicates favorable growth conditions.

Some trees reach great size and enormous age, while others remain small and die young. The size and age which a tree attains depend upon the inherent tendency of the species and the factors of its environment. Some species which naturally grow tall and become old may remain small under unnatural and unfavorable growth conditions. Other species never become large and old under the most favorable growth conditions, since it is inborn in them to remain small.

A definite age limit cannot be fixed for each species, but for general convenience we may classify the common trees as long- or short-lived.

Of the trees in the Eastern states, the oaks, chestnut, buttonwood, tulip, white pine and hemlock may be considered as long-lived trees, while the poplars, willows, birches and some cherries are short-lived.

Most of the native western trees, particularly the sequoia, Douglas fir, sugar pine, and cedar, are long-lived.



**HAVE YOU NOMINATED ONE OF YOUR FRIENDS FOR MEMBERSHIP?
WHY NOT DO IT—NOW WHILE THIS REMINDS YOU?
WE NEED 5,000 MORE MEMBERS THIS YEAR.**

Appalachian Forest Reserve

COMMITTEE'S REPORT

The Executive Committee, appointed September 23, 1915, at the meeting at Washington of the various associations interested in forwarding the extension of the Appalachian Forest Reserve (which action was followed by Congress making an appropriation of \$3,000,000 on August 9, 1916, for the purpose), presents this report.

The meeting followed a call of the American Forestry Association for joint national effort to secure from Congress further support for the extension of the work on the Reserve. It was attended by representatives of the following organizations:

THE AMERICAN FORESTRY ASSOCIATION
 MASSACHUSETTS FORESTRY ASSOCIATION
 SOCIETY FOR THE PROTECTION OF N. H. FORESTS
 NORTH CAROLINA FORESTRY ASSOCIATION
 APPALACHIAN MOUNTAIN CLUB
 APPALACHIAN PARK ASSOCIATION
 KNOXVILLE BOARD OF COMMERCE
 NEW HAMPSHIRE STATE BOARD OF TRADE
 WESTERN NEW ENGLAND CHAMBER OF COMMERCE
 PENNSYLVANIA FORESTRY ASSOCIATION
 CONNECTICUT VALLEY WATERWAYS ASSOCIATION
 SOUTHERN COMMERCIAL CONGRESS
 NEW HAVEN CHAMBER OF COMMERCE

A Memorial was prepared, and was presented to the Hon. David F. Houston, Secretary of Agriculture, at a meeting at his office attended by all the delegates. This Memorial (which was printed in *AMERICAN FORESTRY* for October, 1915), gave succinctly the history of the movement which originated in 1899, and showed what had been so far accomplished, and that only approximately \$8,000,000 of the \$11,000,000 appropriated by Congress in 1911 had been expended. The necessity for further appropriation was urged,—the unexpended balance of \$3,000,000 no longer being available, it having lapsed from non-expenditure within the time limit set by the Act of 1911.

The country is to be congratulated on the favorable action taken by Congress in the bill making appropriations for the Department of Agriculture, in which there was appropriated \$1,000,000 for the Appalachian Reserve for the fiscal year ending June 30, 1917, and \$2,000,000 for the fiscal year ending June 30, 1918.

In addition to the organizations attending the conference with Secretary Houston in September, 1915, many other influential bodies throughout the country joined in and supported the movement, and the favorable result has brought widespread gratification as a wise and progressive action forwarding a program of national development full of promise of good to the agricultural, transportation, and business interests of the country,—and economical in the fact that any intermission now in the great work on which \$8,000,000 has been wisely expended, would result in great loss, as stated in the Memorial adopted in September, 1915, from deterioration by fire and flood, an unnecessary loss that would greatly increase the ultimate cost of properly completing the work.

The Committee desires to acknowledge with high appreciation the widespread and active coöperation of influential organizations and individuals throughout the country as soon as it was requested by the American Forestry Association and also by this special Executive Committee. The necessity for the inception and continuance of the movement for the Appalachian Reserve has now been made manifest to the country, thanks to the effective work of those coöperating, and on behalf of all who have been thus interested, the Committee begs to express to the members of the Senate and of the House of Representatives grateful and hearty appreciation for the attention given to the letters and statements presented, explaining the need of the appropriation now made, and for the action finally taken in furnishing the means to carry on this great national improvement.

HENRY STURGIS DRINKER,
President of Lehigh University

PHILIP W. AYRES,
Forester of the Society for the Protection of New Hampshire Forests

PERCIVAL SHELDON RIDSDALE,
Executive Secretary of the American Forestry Association

Committee.

CONDITIONS IN MAINE

THERE is a marked tendency on the part of small owners and speculators in Maine to cut their forests clean for pulpwood, writes a correspondent. Land with \$15 an acre of saw-logs to 12 inches will often have \$30 an acre of pulpwood left. Taxes are *never* reduced after cutting the saw-logs. Owners desiring to dispose of their lands frequently now sell all the saw-log and pulpwood stumpage and then turn what's left back to the state. In one instance an owner of 10,000 acres,

who had determined to put his money into another form of investment, was offered \$16.00 an acre, and could not get the \$20 that he asked; and then ran across a pulpwood operator who offered him \$3.25 a cord right through for all soft wood including some poplar and white and yellow birch. Last fall he said they had cut over not quite half his land and had turned in \$245,000 in stumpage. He will net better than \$50 an acre and get cash payment in two years. No wonder he is not interested in conservation.

Standing Timber Insurance

By W. R. BROWN

UNTIL recently there has been little or no insurance offered on standing timber in the United States and no formulated opinion on the subject. Lloyds of London, the first company known to have offered standing timber insurance in Canada, placed it on excess loss over a given amount on separate limited tracts, or, in other words, the owner was the initial co-insurer, to a large extent, on his own land, Lloyds merely taking the additional risk over and above a stated amount on various restricted areas. The Phoenix Assurance Company of London, in their Pacific Coast Department, this year is offering a limited line on green standing fir, spruce, cedar and pine timber in Oregon and Washington, west of the summit of the Cascade Mountains, on prearranged stumpage value, to owners at from 1 to 1½ per cent, and to bond holders at from ½ to ¾ per cent, over a full season. Such timber must be accessible to market, not unduly exposed, and only one risk is taken in certain zones or fire areas established by the company. No risk greater than \$17,500 is written in any one fire area. The rate of 1½ per cent is made up of ¼ of 1 per cent for the wet, and 1¼ per cent for the dry season, for which part no return premium is payable, and it is interesting to note that 33⅓ per cent is taken off of all premiums for approved patrol.

Formerly, when old line insurance companies were approached for standing timber insurance, they invariably shook their heads and mentioned the great amount of capital tied up in timber, the vast reserves necessary to cover such values, the danger of a general conflagration, the inevitable dry season, and quoted from some exaggerated newspaper report, and stated that in their judgment such insurance would be hazardous in the extreme and require an unreasonable rate. On the other hand, timber bonding houses and large owners, who had gone many years without suffering serious loss, asserted there was no unreasonable danger, provided the tracts were well scattered and of sufficient extent, and large bodies of timber insured themselves. Small owners instituted as much protection as possible and took their chances of complete loss.

No accurate data existed as to the location, extent and damage done by fire, and almost no organized protection existed. Meanwhile estimates made by newspaper reporters were taken in the popular mind as actual facts. To meet these conditions, the United States Forestry Department in 1905 commenced the scientific administration of public lands and included adequate fire protection and the gathering of statistics. State forestry departments followed its lead, and private fire protection associations sprang up, the first organized in the Pacific Northwest six years ago, and thirty or more elsewhere throughout the Union. Railroad cooperation was se-

cured. Protective laws were passed and enforced. A campaign of public education was carried on and field methods improved. Accurate statistics were gathered as to the causes of fires and at what points they were liable to occur, what proportion of the values was being consumed each year, and how fires could be minimized and, in a measure, foreseen and anticipated. The compilation of this data has led the writer to believe that the present loss by fire in standing timber is apparently not any greater than that in other forms of property, and that insurance in some instances is desirable on standing timber, and that an inter-insurance association among owners can now be formed and be both economical, successful and beneficial.

Without going too much into the dry details, the writer will sketch his reasons for his opinion that timber is insurable and the principles on which such inter-insurance association should be founded:

First, there is at hand five years of fairly accurate data collected by the agencies above, which show, on an average, a loss in value of less than ½ of 1 per cent and this average loss through increased protection is *constantly diminishing*. For the twelve western private forest protection associations, amalgamated under the management of Mr. E. T. Allen, and which cover an area of twenty-two million acres, there has been spent yearly about \$200,000, or nine-tenths of a cent per acre per year, and as to the average annual loss I will quote from a letter received from Mr. Allen:

"I have your inquiry of April 25th. About all I can do is to compute the feet of merchantable timber destroyed, with a very rough estimate of the total stand under protection, which in percentage would apply about equally well to values. This gives us in 1910 a loss of ½ of 1 per cent; in 1911, 1/150 of 1 per cent; in 1912, 1/108 of 1 per cent; in 1913, 1/10000 of 1 per cent; in 1914, 1/10 to 1/15 of 1 per cent; and in 1915, 1/220 of 1 per cent. . . . Nobody knows, of course, but we should guess that (as 1914 was as bad a year as 1910 in hazard, and improvement of methods got us through with a tenth of one per cent loss), it is pretty safe to say that (as a year five times as hazardous is almost inconceivable), we shall never equal half of one per cent again unless war or some other disaster destroys our protective system itself."

The New Hampshire Timberland Owners' Association, with a million acres on which they spend one cent per acre per year, sustained a loss in 1911 of ¼ of 1 per cent; in 1912 of ¼ of 1 per cent; in 1913 of 1/9 of 1 per cent; in 1914 of 1/10 of 1 per cent; and in 1915 of 1/5 of 1 per cent. The Northern Fire Protective Association of Michigan, with an area of two million acres, on which they spend 1 cent per acre per

year, reports yearly losses as follows: 1912, $\frac{1}{10}$ of 1 per cent; 1913, $\frac{1}{20}$ of 1 per cent; 1914, no report; 1915, $\frac{9}{10}$ of 1 per cent. The St. Maurice Valley Fire Protective Association of Quebec, with an area of eight million acres on which they spend $\frac{1}{4}$ of 1 cent per acre per year, reports the following losses: 1913, $\frac{1}{2}$ of 1 per cent; 1914, $\frac{3}{4}$ of 1 per cent; 1915, when one big fire got away, $1\frac{1}{2}$ per cent. These being the large representative private associations in four widely scattered sections of our country and Canada.

Even the fire hazard, represented in the popular mind by a general conflagration, a more accurate statistic will show (when compared with the value of the remaining timber stand in the states in which they occur) is a small percentage of the whole value involved. Minnesota with a forest wealth valued at 280 millions, during the last ten years has had a computed loss each year of only \$100,000, or about $\frac{1}{34}$ of 1 per cent annually. Maine, with a valuation of 100 millions of timber, lost for four years, from 1909 to 1912, \$64,000 annually, or $\frac{1}{16}$ of 1 per cent. In the United States Forestry Bulletin No. 117, entitled "Forest Fires," it states that in 1891, a very bad year for fires before there was any protection, the annual loss throughout the United States was \$25,000,000. If the 550,000,000 acres of timbered area in the United States was worth at that time on an average of \$5 an acre, this would be a little less than 1 per cent loss yearly.

Conflagration hazard for insurance purposes could be counteracted by the distribution of small individual risks widely placed over various sections of the country among many owners under various climatic conditions, giving preference, if possible, at the start to a country broken by settlement, and in which the yearly losses prove to be the most uniform, like New England. Past computations usually have paid small attention to the fact that a considerable percentage of such fires occur in cutover and so comparatively worthless lands, and that where burned timber was reasonably near to market much salvage could be taken. Estimates also included value destroyed in young growth and the burning of the soil, which set back the productivity of the land. While these two losses are very real, and in the end should be protected by insurance, for immediate practical reasons soil and growth are not included in this paper. It is true that there are foreign timber insurance companies in Germany and Sweden which insure young growth and soil as well, but the method of computing values is so complicated, with its growth tables, species, methods of management, expectation values, markets, etc., that it is not practical or applicable to American conditions now, and is impossible.

All told, there are 92 million acres with more or less private protection and 187 million acres with more or less public fire protection, or, in other words, about half of the timbered area of the United States. In 1913, statistics show that public and private agencies spent a little less than a million dollars on 250 million acres, being four-tenths of a cent per acre annually. Insurance should be restricted to the areas which are adequately protected.

To meet the difficulty presented by law in some states to the establishment of fire insurance companies, calling for immense reserves to assure the great values tied up in timber, the difficulty of obtaining charters from legislatures conforming to multitudinous requirements, the difficulty of restrictions placed upon doing an interstate business, it is possible to form an inter-insurance association like so many that are now operating among owners of timber yards, saw-mills and other industrial properties in the United States, with no record of failure. The inter-insurance associations, like the mutuals, are conducted at cost for the individual subscribers by crediting back the unused balance of premium to each account yearly. But unlike the mutuals, by doing no outside business, or business for profit, they are subject neither to Federal or State supervisory boards, and are easily organized and controlled by a board of supervisors. Business is done under the management of a single, mutually appointed attorney-in-fact, who acts separately for each subscriber. The office where this is done is called an exchange, as it is there that insurance is exchanged amongst subscribers. Legal opinion as to this has been given by Hon. John T. Barker, attorney-general of Missouri, on May 7, 1914, and Mr. Stites, corporation lawyer of Washington, D. C., in October, 1914. Some of such successful inter-insurance associations are the Lumber Manufacturers' Inter-Insurance Association of New York, with 300 members, attorney-in-fact, Wilcox, Peck & Hughes; Lumbermen's Exchange, Kansas City, Missouri, attorney-in-fact, J.W. Garvey & Company; National Lumber Manufacturers' Inter-Insurance Exchange, attorney-in-fact, Charles F. Simanson, Chicago, Illinois, and many others.

Granted that the average annual loss to standing timber would be about $\frac{1}{2}$ of 1 per cent, and that the cost of management of an association would be about $\frac{1}{2}$ of 1 per cent more, as is customary in the companies above, the usual rates charged by commercial insurance companies for ordinary risks running from $1\frac{1}{2}$ to 3 per cent, the difference between these two of $\frac{1}{2}$ to 2 per cent saving would form a sum sufficient to set up a reserve, which in a short time would be ample, if the individual risks were kept small and widely scattered, and only a limited line of insurance were written for each subscriber. After such a reserve was established, the subscribers would receive the unexpended amount of the premiums each year, or receive insurance at cost, retaining meanwhile partial ownership in the reserve. Reserves required are commonly $\frac{1}{20}$ of the amount insured, premiums paid in yearly are commonly from 2 to 3 per cent, actual insurance and management should cost about 1 per cent; the insurance allowed on one risk should be limited to a very few thousand dollars, or, if a large line is desired by one subscriber, it might be offered if each risk was widely separated from all others in zones predetermined by the association.

The question then arises, could timberlands stand the 1 per cent premium needed for loss by fire and management? In a strictly forestry sense, they could not, as it

is shown in an article by Professor Lovejoy, of the University of Michigan, in the *Forestry Quarterly*, that a tract of timber which has been wiped out by fire cannot be replaced by growing a new forest at the same cost as the current stumpage value destroyed. While this may be true in his premise of 100-year-crop rotation basis in forest replacement, it is also true that there is still remaining in America opportunity to purchase additional area at approximately the same stumpage price. While it is true that insurance of the timber would eat up a considerable percentage of the growth value (as over-assessed taxes do at present), insurance would, on the other hand, help the plantation and reproduction of trees, in bringing the expectation value of the crop from the future down to the present, and would insure careful superintendence and continuance of protection. Such protection would make certain both profit from growth, and what is of more moment, the increased value of stumpage. Such insurance is practically collecting the present worth of expectation value and commencing a new period of crop rotation. Professor Lovejoy, by proving how slight a yearly loss by fire to uninsured forest property will over a hundred-year period wipe out the profit of growth, proved the necessity of efficient fire protection, and how financially possible and advisable it is to expend yearly even a much greater amount per acre than is now commonly done. By the same argument, he also proved the advisability of insurance, as even the best of fire protective measures must necessarily stop short of complete protection; lightning will continue to strike; fires will continue to be set from unknown causes; and here and there a forest fire is inevitable; so that a wise man with a small valuable tract of timber in an exposed position will seek insurance in order that this irreducible minimum of hazard should be forecast and adequate provisions prepared to meet it.

The moral hazard in the insurance should be reduced by the co-insurance of members, indemnity to be limited to 80 per cent of the valuation. Reinsurance may possibly be worked out after the inter-insurance principles have been proved sound.

Inter-insurance would be of the greatest immediate value to the small owner or farmer whose tract is small, exposed and subject to total loss, as large owners with largely distributed risks practically insure themselves. If large owners will, however, join with the small ones, contributing each a small area, then when the association has proved a success by adding new members and increased territory, with its result of more uniform loss, greater reserve and lower premium, opportunity may be created for the carrying of a large line of insurance on the larger and more valuable tracts. The small and well-distributed risks at the start are more equitable amongst owners, as a more perfect classification of hazard and value can be arrived at and risks amongst owners can be equalized.

An initial guarantee fund is necessary to create an immediate reserve until such time as the surplus of premiums form such a reserve. This should be prefer-

ably a cash deposit. As most land owners are long on land and short of cash, however, to start the association and tide over the first two or three years, title to a small tract of merchantable standing timber could be transferred as a guarantee and accepted as security by the association, and returned when the excess premiums had become sufficient. Subscribers should be bound only to the close of each season and to the extent of their original guarantee, and could withdraw at any time, except in as far as they were bound to make good the losses and costs of management of that particular year. Management should be vested in a board of directors of five and the managing attorney-in-fact, who legally would be the agent of each of the subscribers, and to his judgment they would have to trust the initial complex questions of the relative hazard, acceptability of tracts, valuation, and protection required, in order that all might be put on approximately the same initial basis.

New England should be selected as the region to inaugurate such an association, as it is the most uniform in climate, and shows the most uniform statistics, and a more economic management and inspection could be effected if subscribers were not too extended. The managing attorney-in-fact should preferably be a trained forester with experience, judgment and ability. Classification of risks would call for consideration of the kind and character of species, exposure, soils, neighboring risks, accessibility to market, market values, climatic, physical and moral hazard, and many others, and such an association should start in a small way, proceed with great conservatism, and ask for coöperation and support for a considerable period, in order that a new and desirable opportunity be opened to the timber owner everywhere for the protection of his property and the encouragement of long-time management. Such an association would create a new profession, that of timber actuary. It would gather adequate data concerning fire risk. It would create a more definite market for cutover land and second growth. It would stimulate planting. It would encourage long-time management of lands and demand for adequate protection. Financially, if loans could be secured on insured standing timber for a portion of its value, as is done on other forms of property, and such released capital could be put at work for the owner, it is not unreasonable to suppose that it might earn enough more above bank interest to pay the cost of the insurance on the whole tract. Finally, standing timber insurance would assist in floating bond issues and increase the market value thereof.

HAVE YOU SECURED A NEW MEMBER?

We desire 5,000 new members before January 1, 1917. We ask each member to secure **Just One.**

Will you do it now?

The Lumber Export Market

THE Government will cooperate with the lumber manufacturers of the United States in sending abroad a corps of experts to study the condition of European lumber markets, with a view to a great expansion of the field of the American producer. This was decided recently at one of the most important conferences ever held in American business history, for the conference marked the opening of steps for cooperation between the nation's business men and the Government itself for the extension of American trade abroad.

Part of the result of the conference will be the urging of the immediate passage of the Webb Bill, now pending in Congress, to remove any question of the legality of the organization, by lumber manufacturers and other groups of business men of foreign sales agencies, to secure and distribute orders for American goods to be sent to foreign countries.

The Government was represented at the conference by two members of the Federal Trade Commission, Commissioners W. H. Parry and Joseph E. Davies, by the head of the Forest Service, Henry S. Graves, and by the chief of the Bureau of Foreign and Domestic Commerce, Dr. E. E. Pratt. Dr. Wilson Compton, economist to the Trade Commission, was also present in an advisory capacity. On the part of the lumbermen, there were present some score of manufacturers and secretaries of lumber manufacturing organizations, including the National Lumber Manufacturers' Association, the Southern Pine, California Redwood, West Coast, Northern Pine, Northern Hemlock and Hardwood and Gum Lumber Associations.

BEFORE taking up the question of how to organize the American lumber industry to best secure the great volume of foreign lumber business that must come to the United States, even before the European war ends, there were some detailed reports given of the conditions abroad, by the various interested organizations, as well as from governmental agencies. Briefly summarized, these conditions are as follows:

Belgium.—Forests entirely destroyed, the nation so wrecked physically and financially that it will have to be entirely rebuilt, and this rebuilding will have to be financed by the major powers.

France.—Northern France must be rebuilt, enormous distances of railroad lines laid, with a consequent demand, beyond estimate of quantity, for railroad ties, sleepers, and lumber to entirely rebuild the farm buildings, villages and cities of northern France. This need will be definite, regardless of the outcome of the present war.

England.—Its forests, as well as those of Scotland, denuded, the supply of lumber already exhausted, and imported lumber needed for all future building, until new

forests grow to take the place of the timber cut to use for war purposes.

Italy.—The supply of timber is gone, used in war operations, either for Italy herself or her allies, and great quantities in immediate demand.

Spain.—The forests cut, and the lumber sold to warring nations.

Germany.—No estimate made of conditions, but the need is only less than that of the allied powers in proportion to the extent to which the German Government has foreseen the future and prepared to meet the emergency by the holding of great tracts as public forest.

Russia.—Has great supplies of standing timber, Baltic pine, chiefly, but not during the war, at least, available to the other allies and even after peace is declared not suited to the demand, owing to its lower quality.

TO secure this business, it was declared to be only necessary for the American lumbermen to go after the trade systematically, with an advance knowledge of the needs of the various nations, and the securing of information as to markets and business practices. It was stated that the French Government has already offered to buy enormous quantities of railroad timber on twelve months' interest-bearing notes.

The Government, through Dr. Pratt, called this conference in the belief that it was a function of the Bureau of Foreign and Domestic Commerce to assist the lumbermen to develop this market efficiently and the lumbermen voted to join in the movement by partially financing the expenses of trade commissioners to proceed at once to Europe and begin gathering information. The method of working out the underwriting of this expense was left to a committee headed by President R. H. Downman, of New Orleans, of the National Lumber Manufacturers' Association.

The organization of exporting associations, or foreign sales agencies, is favored by the Federal Trade Commission, and all question of the legality of such organizations is to be removed by the Webb Bill, introduced with the sponsorship of the Trade Commission.

THE most illuminating exposition of conditions abroad was made by John E. Rhodes, secretary of the Southern Pine Association, which sent a representative abroad several months ago, and whose reports, already fragmentarily at hand, show that the demand for lumber will be beyond belief. France, it was shown, as well as other foreign powers, is strongly prejudiced in favor of American lumber. The plan of rebuilding France, as being outlined by French governmental authorities, is to have towns and villages on the community basis,

with model farms on the American plan. The picture of utter devastation presented by Mr. Rhodes, as part of his showing of the opportunities for American lumbermen, was striking. It so impressed the representatives of other lumbering regions that they agreed that it was time for American lumber manufacturers of all sections to unite to care for this great market, regardless of whether the interested districts themselves were exporters or not. This was phrased by O. T. Swan, secretary of the Northern Hemlock and Hardwood Manufacturers' Association, operating in Upper Michigan, Minnesota and Wisconsin, when he said:

"We must realize that anything that assists in providing a market for another species of lumber helps the whole industry. A field that provides an outlet for southern pine relieves the hemlock territory of competition from the South, from mills which are selling at perhaps less than cost, to help the manufacturer secure cash to keep his men at work in dull times."

J. M. Pritchard, of Memphis, of the Gum Lumber Manufacturers' Association, said:

"We have seen the time in our Association when our manufacturers were actually selling at a price below the cost of production in order to keep their plants in operation. The extension of the market may not affect gum lumber to any great extent, but it will give the gum lumber manufacturers relief from some of the recent disastrous competition."

THE fly in the ointment was placed on exhibition by Thorpe Babcock, of the West Coast Lumber Manufacturers' Association, when he said:

"I just want to call your attention to the fact that, owing to the ocean shipping conditions, the West Coast Manufacturers, who have already at hand the exporting company, are unable to fill orders, for the lack of vessels in which to convey the sold lumber to the over-sea purchaser. Before this investigation can become profitable, this condition must be remedied by the providing of ships."

The problem of shipping, however, was left, with other details of the opening up of the foreign market, to the committee to be appointed by President Downman. Dr. Pratt said that his bureau, which will have charge of the investigation, will make its plans at once, in the hope that the investigators and agents can be on their way abroad by November 1.

TOURIST registers are in use on many of the National Forests. By registering their names and destination, persons going into the mountains can arrange to have telegrams and other important messages forwarded by the forest rangers.

EXPERIMENTS at the Forest Products Laboratory at Madison, Wisconsin, have resulted in the discovery of a method whereby the yields of alcohol and acetate of lime from the destructive distillation of hardwoods have been increased fifteen per cent.

WHITE PINE CONDITIONS

BY ROBERT T. MORRIS, M.D.

THE area of white pine growth extends farther northward than would be indicated by the map on page 389 of the July issue of AMERICAN FORESTRY. I have observed fine white pine trees in mixed stands as far north as the Hudson Bay post at Flying Post on the Moose River. Some of these trees were considerably more than one hundred feet in height, and I measured trunks up to forty-four inches in diameter. They were growing with jack pine, white and black spruce, arbor vitae and tamarack, although the latter tree was apparently being killed off cleanly in the whole James Bay basin by saw-fly larvæ.

In connection with the saw-fly question, I can add one more pine to the list of victims in the Buttrick list. On my country place in Stamford, Connecticut, saw-fly larvæ have attacked the red pines (*Pinus rigida*) and would have killed some of them had I not detected the presence of the larvæ in time, and sprayed the trees with arsenate of lead. Saw-fly larvæ have killed a good many of my white pines at Stamford, but two species of aphids are responsible for the deaths of many more, several thousand young white pines, in fact. The white woolly aphid has been most destructive because the yellow ground-ants plant so many colonies upon the roots that the trees suffer not only from the aphides but from drying of roots along the ant tunnels. Another aphid of darker color and of a species not determined does not attack so many of my white pines, but it is very fatal to the ones that are attacked, and quickly, unless I happen to notice that the tree is attacked and spray it with tobacco extract. The black ants serve as colonizers for this species. Parenthetically I would add that a small reddish ant colonizes aphides, which are very destructive to Japanese, Chinese and cultivated varieties of American persimmons in Connecticut.

Among the enemies of the white pine in that State must be included rabbits and red squirrels. Both of these animals bite off the stems of very young pines destructively, and the red squirrel will sometimes nearly girdle white pines eight or ten years of age, although this latter injury is not of frequent occurrence. The weevils have lately attacked the few white pine trees that I had managed to carry past other enemies. Of the many thousand white pine trees that have been set out upon my property, varying in age from two-year-old transplants up to trees seven or eight years of age planted with balls of earth, it is a question if as many as fifty trees remain altogether. This means that in that particular part of Connecticut, at least, reforestation with the white pine would be practically out of the question.

THE rabies epidemic which is carried by infected coyotes is spreading eastward in Utah. Rabid coyotes are common in the entire western part of the State, and one has been killed within thirty miles of Salt Lake City.

Wood Preserving Department

BY E. A. STERLING

IN the gradual adoption of wood-preserving methods by small consumers for farm and home use, the decision to use treated timber is usually based on the stated facts that decay of timber may be prevented indefinitely by the application of a proper preservative. Those most familiar with the theory and practice of wood preservation are apt to forget that the average consumer has had no occasion to investigate the reasons for the decay of wood, or to ascertain why certain oils or mineral salts will prevent or retard its action. It is, therefore, interesting to review some of the essential features of timber decay and its prevention.

Nature has provided for the return to the soil, or to conditions resembling it, of all organic matter after it has performed its life function. Otherwise the earth would be encumbered with dead animal and vegetable growths. The medium for this dissolution in the case of wood is mainly a low form of vegetable growth known as fungi. Bacteria may contribute to this result, but in a more obscure and less understood way than fungi. Wood-destroying fungi have their origin in microscopic spores which correspond to the seeds of plants. These spores are present everywhere in the air, and develop rapidly when they lodge upon wood under conditions favorable to their growth. The essential requirements for their growth are moisture, air, moderate temperatures, and food supply. These requirements obviously exist under most outdoor conditions, especially where wood is in contact with the ground, or at the ground line. The fact that all wood is not immediately destroyed is due to its inherent resistance, or to the absence of one or more of the essential factors, usually that of moisture. Furniture and wood used elsewhere indoors lasts indefinitely because it is dry, and is usually protected to an extent by a surface coating of paint or varnish.

THERE are several kinds of wood-destroying fungi, but all develop in practically the same way. The tiny spores germinate and send out invisible threads of growth which gradually extend through the tissues of the wood, breaking it down through the process of absorbing certain elements for food. This growth may develop gradually or rapidly, according to conditions, and frequently there is no external evidence until decay is firmly established or widely extended. These hyphal threads may extend and work independently, or become massed together into what is known as mycelium, which is the scientific name of the mass of white fibers often seen between damp boards or under bark. Ultimately these feeding threads produce fruiting bodies which appear on the surface as shelf fungi, or what would be popularly called toad-stool growths of various forms and

colors. In these fruiting bodies are produced the spores which reinfect other pieces of wood.

The function of wood preservatives is to have a toxic or poisonous effect on the fungi spores, so that they are killed or cannot develop. Since all decay originates on the outside, often a superficial coating of preservative oil or paint prevents decay for a time. Surface checks and other abrasions ultimately, however, give the spores ingress, after which they develop in the interior of the stick regardless of surface coating. It is for this reason that the most effective preservative treatment actually penetrates the tissues of the wood for a considerable distance, or, as in the pressure treatment, permeates either the entire stick, or at least the sapwood, which is the most liable to decay.

THE relative durability of different woods is an interesting subject in itself. This natural resistance to decay is considered in selecting woods for treatment, and is really a phase of wood preservation, although not concerned directly with the kind or application of preservatives. The durability of such woods as cedar, locust, osage orange, redwood and cypress is well known. With the reason for decay in mind, one naturally questions why these woods should remain sound longer than others. It is easier to ask the question than to answer it.

A wood like locust and cypress, which resists decay, must have some natural qualities which retard the growth of wood-destroying fungi in much the same way as artificial preservatives. Just what these qualities are is not clear. There must exist in these woods some natural oil or substance which is unfavorable to fungus growth. The dense heartwood of pine, since it is heavily impregnated with resinous substances, offers physical resistance to fungi by keeping out moisture and air. Cypress and redwood, on the other hand, are comparatively light woods without resinous contents. What retards decay in one case, therefore, may not be present in some other wood. In chestnut, which the farmers for years have used for fence posts, because quite durable, tannic acid is present in considerable quantity, and has been tried as a constituent of some preservative compounds. Among the durable woods, the sapwood, or outer portion, is less resistant to decay than the heartwood. This is for the reason that sapwood contains more starch and sugar which serve as desirable food for the fungi. This is well illustrated in the case of fallen trees of western red cedar which are often sound after lying in the woods for a century or more. The sap portion in all such cases, however, is completely rotted away, and it is only the heart which remains under the moist, decay-producing conditions of the forest floor.

Editorial

PRESIDENT WILSON SPEAKS PLAINLY

ONE of a number of bills, introduced in Congress with the intention of tearing down the bulwarks of our National Forests and of bringing these reserved lands under the operation of general laws permitting the alienation of titles and the acquisition of the land by states, communities and private citizens, passed Congress recently, only to receive a deserved veto by President Woodrow Wilson on August 22.

This bill, known as House Bill 11,162, would have given to every city and town, now or hereafter to be established, the right to take from national forest lands a total of 1440 acres for several public purposes.

The President in his veto calls attention to the fact that the existing laws provide ample means for the attainment of the public purposes contemplated by the bill. Cemetery grounds if needed can be eliminated by presidential proclamation. For municipal water supply, special cooperative agreements are in force which fully safeguard the interests of the public. Touching parks and recreation, the President says:

"The Department moreover is already providing for special local needs for recreation purposes by making the National Forests freely available for such uses and by taking steps to develop their availability as public recreation grounds." Continuing, the President points out the fundamental objections and dangers of this class of land legislation, a warning which is needed at this time. He says:

"The bill which I returned would give cities and towns the right to select and acquire a total of 1440 acres

of land for the several purposes mentioned, at a uniform price of \$1.25 an acre, without regard to the value of the timber on it or to the need of the land for other public purposes; or to the effect of the alienation of ownership on the administration of the forests, and especially upon the administration of adjacent or neighboring areas. Counties may select 640 acres. Since the same rights would accrue to new cities, towns and counties, this *general grant* might in the long run result in the alienation of a very large proportion of the national forest area.

"But the most serious objection to the bill is that it subjects the National Forests to disposition under a general grant. At the very time while provision is being made for purchase by the Government of forested lands in the East for the protection of the watersheds, it is proposed to permit similar lands in the West to be permanently alienated. I would respectfully urge that it is unwise to permit alienation of the National Forests under general legislation of this sort. If the process of piecemeal distribution is begun, independent of any oversight or control of the National Government, there is manifest danger that the forests will be so disintegrated as to make their efficient administration impossible and the purpose for which they were established unattainable.

"Against such a process the National Forests should be carefully protected."

What clearer, more concise and more convincing statement could there be than this utterance of the Chief Executive against the piecemeal distribution of our National Forests which is attempted by many and various bills at each session of Congress?

COMMERCIAL GRAZING VERSUS WILD LIFE IN NATIONAL PARKS

THE bill creating a national park service in the Department of the Interior, in place of the present inadequate piecemeal administration, is on the Senate calendar and should speedily pass.

But there is one provision in the bill as it stands which should be promptly eliminated before it becomes a law, and that is the opening up of these national parks to commercial grazing of sheep and cattle. As it stands, the bill permits the Secretary of the Interior to "grant the privilege to graze livestock within any national park, monument or reservation, when in his judgment such use is not detrimental to the primary purpose for which such park, monument or reservation was created."

There is only one primary purpose for creating a national park, and that is to preserve nature and wild life in its original condition for the pleasure of the entire body of our citizens. Cattle and sheep grazing are com-

mercial uses wholly unharmonious to this primary purpose, and destructive of forage needed by wild game.

If portions of areas now reserved or proposed as national parks can be opened up to commercial grazing without detriment to the primary purpose of the park, it is *prima-facie* evidence that such areas should not be included within the park at all, but should remain as national forest lands, on which commercial uses are permitted and encouraged by law and regulations.

From an administrative standpoint, this provision has some very objectionable features. The Department of the Interior is without any experience in the management of grazing privileges, and at the present time does not take in a dollar of revenue from this source. The grazing policy and administration are wholly in the hands of the Forest Service in the Department of Agriculture, which has, in the eleven years since 1905, built up an efficient

procedure and brings in a revenue of over \$1,000,000 per year.

Should a rival administration of grazing be set up on adjoining areas by the admission of grazing into national parks, regulations would have to be identical or users would exert pressure to have lands transferred from one department to another in order to take advantage of more favorable regulations. Political pressure would be brought to bear on the Interior Department, both to allow

the extension of grazing in the parks, and to create new and larger parks in order to transfer grazing jurisdiction.

There is but one way of avoiding this danger, and that is to continue to prohibit grazing absolutely, as at present, in national parks, and to make the areas of these parks conform to the limits which must be preserved intact for wild life and for the primary purpose of recreation, which is sure to increase in importance and in the benefit which we all share as a common heritage.

The Oregon Forest Fire Association

BY WELLS GILBERT, *Treasurer*

THE Oregon Forest Fire Association was formed in January, 1911, with the threefold object of promoting coöperation among timber owners, inducing the State to assume its responsibility in forest protection and educating the public as to the causes and methods of preventing forest fires.

Many efficient fire patrols existed, but there was duplication of effort and little coöperation. In addition, these patrols from necessity guarded other timber lying in their limits whose owners were shirking expense and responsibility. Some timber was not being patrolled by anyone. Between the heavy timber belts and the farming regions is generally found the "stick-ranch" country in the foothills. Here pioneers cleared patches a few acres in extent, raised some vegetables and grain but depended on their stock for subsistence. Timber had no value in the early days, and their immediate interest lay in burning it and clearing the ground. If the fires got into green timber and burned the brush and dead grass, the grazing and hunting were so much the better. No authority existed for handling general conflagrations and the most destructive fires in the State have started in this region. The experienced hunter was at home in the woods, but the average city sportsmen and the farmer boys were often ignorant of the first principles of forest preservation. Surely, the time was ripe for better methods.

First, the Oregon Forest Fire Association in 1911 secured the passage by the Legislature of a model fire code. A State Board of Forestry was formed, and a practical woodsman placed in charge. One of this board is named by the Association. Suitable appropriations were made and patrolmen placed in the foothill country, thus protecting the main timber belt. Thousands of fire posters were issued by the State Board, the Association, and County Associations, setting forth the fire laws and penalties for their violation and careful instructions as to camp-fires. Many of these circulars, by word and illustration, vividly portray the tremendous waste in wealth and wages caused by fires.

A law was also passed requiring the private owner to patrol his timber during the dry season. If he fails to do so, his interests are looked after by the State or by neighboring patrols, and his land is assessed for the actual expense.

The Association has actively encouraged formation of County patrols. Our secretary acts as manager of these

patrols, and the accounts are handled in his office. Each County Association is financed by the owners interested, who pay assessments on a uniform acreage basis, and is managed by a Board of Directors serving without pay. The State, the County Associations and the Forest Service coöperate and there is no duplication of effort.

The Association now represents over three million acres of timber land. It actively patrols timber lands when desired, but it has best served its members by securing needed legislation and by building up or combining existing patrols. Its motto, if it had one, would be "An ounce of prevention is worth a pound of cure."

The value of its work cannot be estimated. The State has had no destructive fires for several years, and as an indication of the reputation of our protection system, it is interesting to note that western Oregon and western Washington have been selected as the first field in which to offer insurance upon standing timber.

No article on forest fire work in Oregon would be complete without a testimonial to the thorough and novel work done in enlisting public sentiment by Mr. E. T. Allen of the Western Forestry and Conservation Association. Nor must we forget the splendid coöperation and helpful hints of the Federal Forest Service.

The Oregon Forest Fire Association has only had one manager, Mr. C. S. Chapman, formerly a U. S. District Forester. To his ability, patience and enthusiasm we are chiefly indebted for wise legislation and the splendid spirit of coöperation which now exists among Oregon timber owners.

LUMBER AND ITS USES

THE College of Agriculture of the University of California announces a correspondence study course on "Lumber and Its Uses," to be given under the direction of the Division of Agricultural Education. This course, which is prepared by Prof. M. B. Pratt of the Division of Forestry, is planned to be of value to all persons having to do with lumber. It deals particularly with lumber produced on the Pacific coast, the general nature of the assignments being as follows: The Structure of Wood; Physical Properties of Wood; Mechanical Properties of Wood; Standard Grades and Sizes; Structural Timbers; Seasoning of Timber; Wood Preservation; The Finishing and Fireproofing of Wood; Lumber Prices and Cost of Construction; Specific Uses and Qualities of Western Woods.

Canadian Department

BY ELLWOOD WILSON

Secretary, Canadian Society of Forest Engineers

The Canada Paper Company, Ltd., under the able management of Mr. F. J. Campbell, has just paid up \$28.00 per share of deferred dividends on its preferred stock. This company commenced some forestry work last year and this year cut fire lines and began the cleaning up of woodlands. The companies who use the most advanced forestry methods are the most successful financially.

Capt. J. H. A. Acer, Sales Manager of the Laurentide Company, Ltd., has been recruiting a machine-gun battery in Grandmère, and has taken fifteen Company men and has gotten in all, from the St. Maurice Valley, about thirty-five recruits. James S. Scott, a former employee and son of Col. Scott, of Quebec, has received the Military Cross for aviation work. Mr. Stuart, formerly with the Forestry Division, has been promoted for bravery.

The plant of the Abitibi Company, at Iroquois Falls, Ontario, was, fortunately, not damaged by the recent forest fires.

Mr. T. W. Dwight, of the Dominion Forestry Branch, spent two days at Grandmère, looking over the plantations, nurseries, etc., of the Laurentide Company, Ltd.

The fire situation in British Columbia has been dangerous and all permits to burn slash have been cancelled until the danger season is past. Eight settlers have been burned out, but the Fire Protection Service has the matter in hand.

The Riordan Paper Company, of Montreal, have begun, at the advice of their Forester, Mr. Volkmar, and after an investigation of the planting operations of the Laurentide Company, planting operations on their limits. This Company has been financially successful and is up-to-date in every respect.

Mr. A. H. Unwin, a member of the Canadian Society of Forest Engineers, who is at present stationed in Nigeria in Africa, has a very interesting article in the July number of the *Canadian Forestry Journal* on conditions in that country.

The Canadian Pacific Railway is again to the front with a most important project, the establishment of the Canadian Research Bureau, under the direction of the well-known chemical engineer of Boston and a former president of the American Chemical Society. The object of the Bureau is to investigate, organize and systematize our

natural resources, minerals, metals, hydro-electric possibilities and forests and to formulate plans for the lessening of waste. The bulletins issued will be sent out to manufacturers, merchants and others interested.

The distances covered by experienced forest rangers are seldom realized. During thirty-nine days the sixty rangers employed by the Lower Ottawa Forest Protective Association covered 21,678 miles of trails and highways, making an average of about ten miles a day, which, considering the country, is pretty good going. The telephone has been of the greatest value in the work of this Association. The W. C. Edwards and Gilmour and Hughson Companies have built quite a number of miles of lines, and the Association is negotiating to take over and operate these.

Mr. Herman Schanche, who has been for the past year with the Laurentide Company's Forestry Division, is returning to Penn State College to continue his forestry studies, as is also Mr. Charles Claxton, who has been in charge of fire ranging on the Company's planted lands.

Mr. Arnold Hanssen, of the same Company, and a member of the Canadian Society of Forest Engineers, who has done splendid work in the establishment and development of the Laurentide's nurseries, is going to take the forestry course at Yale this winter. Mr. Hanssen graduated at the University of Königsberg in Norway and has worked at Grandmère ever since coming to Canada.

Recruiting for the 242nd Forestry Battalion, C. E. F., under Lt.-Col. J. B. White, of the Riordan Paper Company, of Montreal, has begun and the Battalion hopes to get to strength and go over to England before November. This will be a most excellent opportunity for foresters or forestry students to see and work in the forests of England and France, to get a good military training, and to help the Allies in their fight for the world's liberty. Men of American residence can probably enlist and will meet a fine body of men. The editor of this Department will gladly receive inquiries.

Lieut. J. G. Sheare, 1st Regiment, Grenadier Guards, president of James Shearer Company, Ltd., dealers in sash and doors, of Montreal, was recently presented with a testimonial from the Royal Humane Society for his gallant service in stopping a runaway horse.

It Was Asheville, N. C.

In the article, "County, City, Town, and School Forests," by J. W. Toumey, director of the Yale Forest School, in *AMERICAN FORESTRY* for July, Asheville, N. C., was inadvertently placed under the state heading, New Jersey.

A Firm's Changes

The firm of Thomas Meehan & Sons, of Dresher, Pennsylvania, was dissolved recently and announcement made that the retail department and nursery at Germantown, Philadelphia, and the landscape department at Mt. Airy, Philadelphia, will be continued by S. Mendelson Meehan and J. Franklin Meehan, under the firm name of Thomas Meehan & Sons, while the wholesale department and nursery at Dresher, Pennsylvania, will be taken over by Thomas B. Meehan and his son, Albert F. Meehan, and will be conducted under the firm name of Thomas B. Meehan Company.

Blowing Up a Tree

R. F. Vann, of Columbia, South Carolina, writes: "Some time ago a neighbor had a fine large hickory tree blown down during a storm. After obstructing a roadway for some time, he decided to cut it up. It had then become dry and, being knotty, was extremely tough. When he tried to saw it, the timber closed on the saw. Then we bored holes in the top and sides of the log, loaded them with dynamite and tamped with a stiff yellow clay. In priming we used electric fuses and fired the shots all at the same time. It took just about an hour to dispose of this tree which had been an eye-sore for several months."

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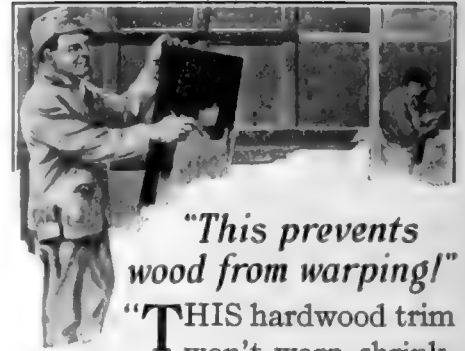
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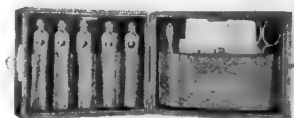
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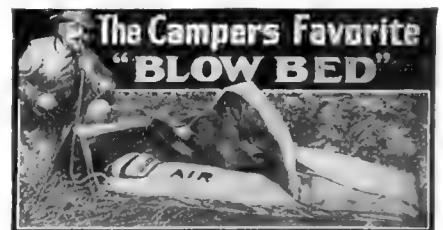
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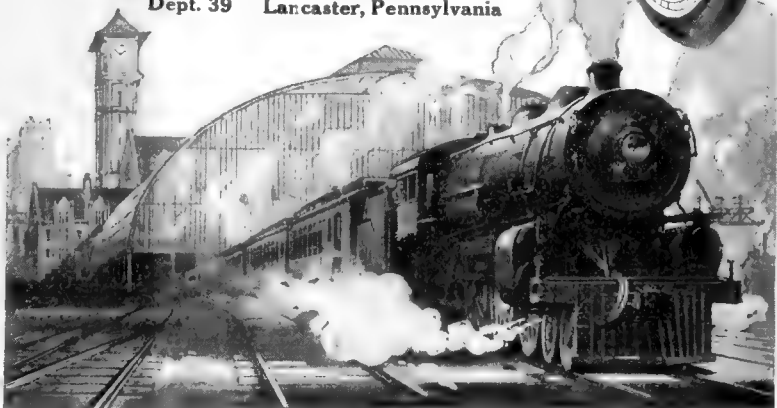
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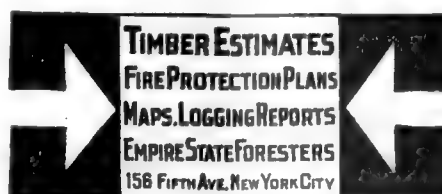
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Indian forest records, April, 1916.—Note on the economic uses of Rosha grass, *Cymbopogon martini*, by R. S. Pearson, p. 1-45; Note on the constants of Indian geranium oil, by Puran Singh, p. 46-50.

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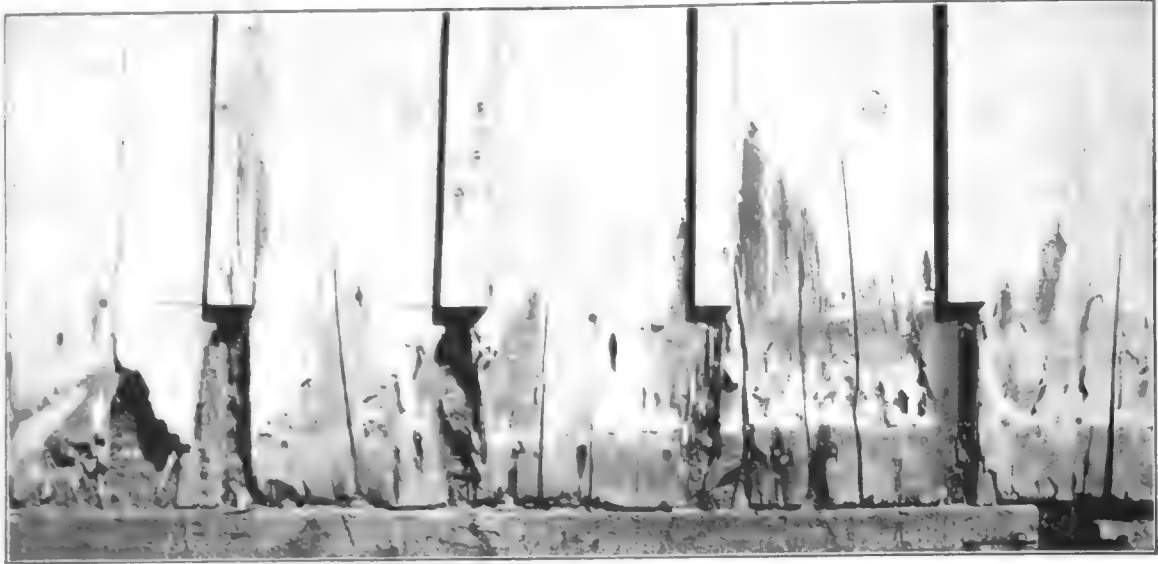
Vol. 22

OCTOBER 1916

No. 274



THE BALD CYPRESS



Decayed Barn Sill. Note condition of siding at point of contact with sill. (Courtesy U. S. Forest Service.)

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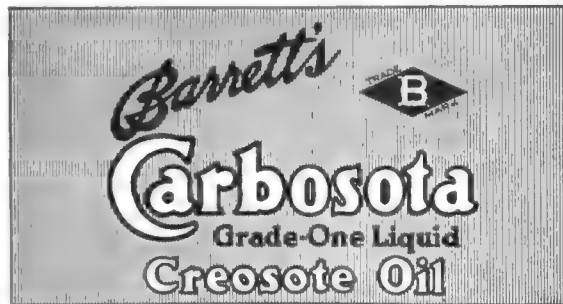
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AMERICAN FORESTRY

The Magazine of the American Forestry Association

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OCTOBER 1916. VOL. 22

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The Bald Cypress

(*Taxodium distichum*)

Identification and Characteristics

By SAMUEL B. DETWILER

THE interesting habits of the bald cypress give it special distinction in the forest community. It is one of the few cone-bearing trees that shed their leaves each year, and the branches that bear the leaves also fall with them. It has ability to send up vigorous sprouts from the stumps when the trees are cut,—a rare power in conifers. Not only is it exceptionally beautiful in form and foliage, but it is one of our most valuable lumber-producing trees, with heartwood so durable that it has the title of "The Wood Eternal." Other trees are adapted for growth in swamps, but they soon die if the soil is continuously flooded. Bald cypress alone can live and thrive with its roots always submerged; the unique "knees" which enable this tree to sustain life under such extremely adverse conditions have furnished scientists with a fascinating problem as to how they accomplish their purpose.

Bald cypress (*Taxodium distichum*) traces its descent from a very ancient family. Prior to the glacial epoch, it grew in the Arctic regions of North America and Europe. Bald cypress should not be confused with the true cypresses, to which the European cypress belongs. It has two closely related species, one a shrub native to China, the other a large tree found in Mexico. The Mexican cypress may reach 40 feet in

diameter at the base and lives to a great age. The "Cypress of Montezuma," revered by the Indians long before the discovery of America, belongs to the

Mexican species. The natural growth of bald cypress is found in the wide strip of low, sandy land bordering the Atlantic and Gulf coasts, from southern Delaware (and the extreme southern portion of New Jersey) to southern Texas. It grows in all sections of Florida, Louisiana and Mississippi and extends northward through the Mississippi Valley to southern Indiana and western Kentucky.

In very wet places the foot of the trunk flares into a fluted, heavily ridged cone, which may be so broad at the base that the tree appears as though it had built a platform on which to erect its trunk. The enlargement of the base, combined with the peculiarities of its root system, gives the tree great stability in the ooze of the sloughs and swamps. Windstorms that uproot the oaks do not harm the cypress. Above the swollen base the trunk tapers evenly and is usually straight. When young, the trees have rather erect branches, forming a handsome and symmetrical pyramid, but later the branches droop slightly. Old trees lose their lower branches and the tops become rounded in the open or broad and flattened in the forest; such trees, especially when festooned



THE BALD CYPRESS

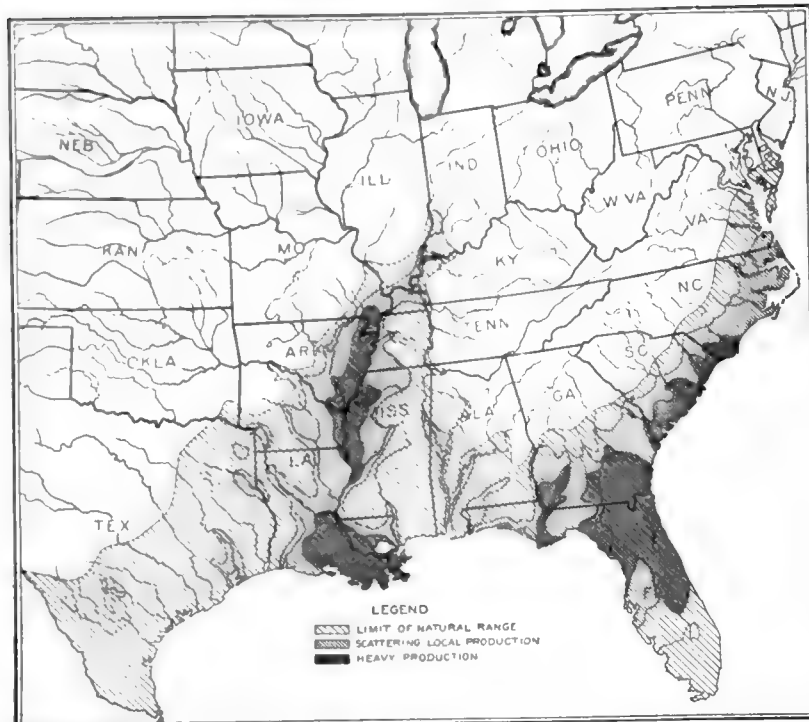
Cypress is a conifer, but not an evergreen tree, and both leaves and branchlets are dropped in the fall. The foliage consists of very small, flat, or needle-shaped leaves, arranged either in two horizontal rows or clinging closely to fragile branchlets. The pollen-bearing flowers appear in the spring in purple drooping clusters borne at the ends of the twigs. Each flower consists of a few small pollen-bearing scales. The globular cones are brown in color and are about the size of a small walnut. They are scattered singly or in pairs near the tips of the branches and ripen their seed in the fall from flowers that appear early in the spring. Bald cypress is interesting, botanically, as one of the few surviving members of a race of trees which was prominent in geologic times. Among its associates were the redwoods of California. Only two other close relatives are known, one an evergreen cypress on the tablelands of Mexico and the other a tree occurring in China.

with Spanish moss, are highly picturesque. Trunks of mature trees are well rounded, and usually hollow at the base. The ordinary diameters are 3 to 5 feet, but veterans 12 feet through are found. The tallest individuals rise to a height of 140 to 150 feet, the average height being 100 to 120 feet.

Cypress "knees" arouse the curiosity of the visitor when he first sees them. A single tree may be surrounded by fifty or one hundred of these peculiar growths, formed only when the trees stand in wet places. If the water is high, the "knees" appear as steeple-like projections above the surface, some having a regular cone shape, others fantastically knobbed and gnarled. Low water reveals that they spring from the roots of the tree, forming an astonishing system of humps and hollows. Further investigation will show that each knee has its own system of intricately branched roots, reaching down into the muck. In places subject to very high water for part of the year, the knees may be 8 or 10 feet high, but usually they are only from 1 to 4 feet high. Apparently their purpose is to reach above the water to supply air to the roots, and also to furnish a firm footing for the great weight of the tree in quagmires where engineers would have difficulty in devising a foundation capable of supporting a similar weight. The softer the soil, the larger and more numerous are the knees. They are hollow except very early in their development, and the wood of which they are formed is exceedingly twisted in grain and very light in weight. The knees never send up sprouts and they die after the tree is felled.

The bark of the trunks may be thin and scaly or thick and deeply furrowed. Apparently, this variation is due to differences in the conditions of soil and moisture under which the trees grow. The color of the surface of the bark varies from light brown to a deep reddish hue. When the bark is broken it pulls apart into long fibrous strips of an attractive cinnamon shade of reddish brown.

The graceful light green foliage of bald cypress is especially attractive. The leaves are of two kinds, and



GEOGRAPHICAL AND COMMERCIAL DISTRIBUTION OF CYPRESS IN THE UNITED STATES

Although seven species commonly known as cypresses grow in the United States, only one, bald cypress (*Taxodium distichum*), is of great commercial importance. *Taxodium imbricarium*, a closely related species, occurs in the same range as bald cypress and is cut and used with it. Cypress is restricted in its natural occurrence to deep, rich swamp-lands, but when planted it thrives in as wide a range of climate and soil as most of our forest trees. Naturally, however, it occurs in commercially important quantities only in regions where logging is difficult and expensive. The introduction of larger and more efficient logging machinery has advanced the logging in any specified region from the water fronts into the deeper and less accessible swamp areas. Thus, the evolution in logging methods chiefly accounts for the continual commercial importance of cypress in regions where lumbering was actively in progress many years ago.

variety (*imbricarium*) of bald cypress.

The flowers are of two kinds. The pollen is shed in spring from drooping clusters of minute purple flowers. The stems of the flower-clusters are 4 to 6 inches long and are borne at the ends of the twigs. The seed-forming flowers are scattered near the ends of the branches. They are composed of numerous overlapping, pointed scales and somewhat resemble buds. When ripened in the autumn, they are transformed into brown woody cones of the size and shape of a small walnut.

The seeds are winged at one end, one-fourth to three-fourths of an inch long, and each cone produces from 20 to 30 seeds. Because the cone contains pockets of very sticky resin with a disagreeable flavor, the seeds are little relished by squirrels, mice or birds. The cones open and permit the seeds to escape but they are too heavy to be carried far by the wind and fall near the parent trees. A pound of clean bald cypress seed contains about 5000 separate seeds—a small number compared with the 80,000 seeds in a pound of Norway spruce. Under ordinary conditions only about half of the seeds have sufficient vitality to germinate. The older trees produce some cones each year and abundant crops are borne every 3 to 5 years. The seeds do not mature well in the northern range of the tree. Since the cypress tree is an inhabitant of swamp-lands the seeds germinate best in very moist places, such as wet muck or beds of sphagnum moss.

The absolute inability of most cone-bearing trees to produce even the weakest of sprouts from the stumps

are borne on tiny branches that are shed with the leaves. In the first type the leaves are thin and soft-textured, a half to three-quarters of an inch long, narrow, flattened and pointed. They stand in two horizontal rows on the tiny branches, like the teeth of a comb, and the branch with its leaves may be easily mistaken for a single compound leaf. The second type of leaf is tiny and scale-like, and clinging closely to the branch and partly overlapping it, so that the branch resembles a delicately wrought chain of leaves. Trees with foliage of this kind are said by some botanists to be a distinct

after the trees are felled is well known. It is decidedly interesting to know that cypress can produce thrifty sprouts, not only from the stumps of young trees, but also from the stumps of trees up to 180 to 200 years of age. This peculiarity of cypress is of considerable commercial value, since vigorous trees 10 to 14 inches in diameter, cut during the period when active growth has ceased, nearly always are able to send up strong sprouts that make much more rapid growth than seedlings. In many localities it is the practice of the loggers to girdle the cypress trees a year prior to felling them so that

is found bordering the deep hollows at elevations of 1000 to 1750 feet. Apparently the chief demand for the successful growth of the cypress is an abundance of soil moisture. It cannot grow in poor, very dry, sandy soils, but in muck, clay or the finer sands, where moisture is abundant and fairly permanent, cypress makes good growth. In ponds where water remains stagnant throughout the entire year the cypress grows very slowly and

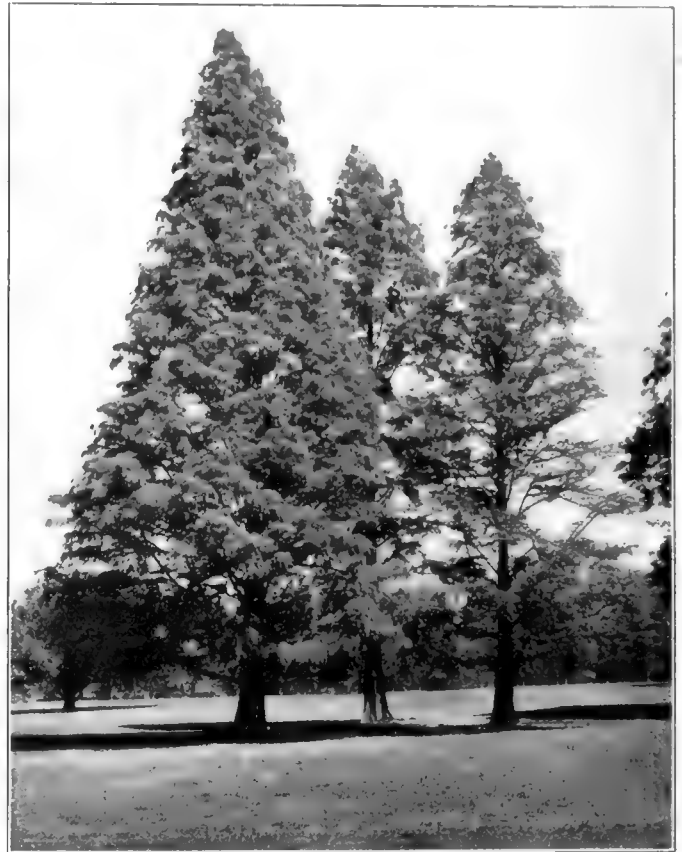


AN OLD CYPRESS

The prevailing size of mature trees in ordinary situations is somewhere about 3 to 5 feet in diameter at breast height (4½ feet above the ground) by from 100 to 120 feet in height. In the highly acid soils of ponds and poorly drained, flat swamps, the average maximum size is about 2 feet in diameter by from 50 to 70 feet in height. The largest trees scattered on ordinary sites are 7 to 8 feet in diameter. The maximum diameter for cypress is about 12 feet measured at breast height. Maximum heights of from 140 to 150 feet are occasionally reached. The trunks of the trees of largest diameters are usually hollow at the base and more or less broken at the top. Cypress attains so great an age that the life periods of virgin stands are better spoken of in terms of centuries than decades. Trees from 400 to 600 years old are very common, and those from 600 to 900 years are scattered through the South. The age attained seems to be limited chiefly by the ability of the tree to resist the attacks of fungi and force of the wind. Old trees die backward or downward during a period usually of one to three or four centuries. The last stage is usually a hollow cylinder consisting of sapwood from which the heart has been removed by decay. It is not improbable that the ages of these hollow veteran cypresses range from 1000 to 2000 years.

the logs will float. In such cases the stumps do not produce sprouts.

The home of the cypress tree is naturally in swamps, ponds and other poorly drained soils. Practically all of the native cypress forests are found at elevations of less than 100 feet above sea level. The upper limit of its growth in the Mississippi Valley is at an elevation of about 500 feet, but on the Edwards Plateau of Texas it



PARK GROWN CYPRESS

Cypress is readily grown from seed and is well adapted to nursery practice. By many authorities it is considered one of the most beautiful and ornamental trees for park planting, for which it has been used quite widely over the eastern and central portions of the United States. Although cypress has not been raised in forest plantations on a large commercial scale, experience thus far points to the commercial success of forest planting, under certain conditions, in the deeper and fresher soils. The rate of growth of individual cypress trees is closely comparable to that of the more rapid hardwoods. Under cultivation, trees grow from 18 to 24 feet in height in the first 10 years. The best height growth in Ohio, for example, has been 3 feet annually for a few years. In fresh or moist soil west of Columbus, some cypress trees are growing 30 inches a year in height. In dry situations, such as eroded clay hillsides and in loose gravelly soils, growth is less than a foot a year. In the District of Columbia cypresses 50 years old are from 20 to 30 inches in diameter by 65 to 84 feet in height, excelling all associated species in rate of height growth. Measurements on growth in forest plantations are not available, but observations show a good development of cypress in height and diameter when properly spaced in planted stands.

does not reach large size. Such trees are known as "pond" cypress. Although we think of cypress as a tree of the South, its natural growth extends into a region where the winters are fairly severe and individual trees planted as far north as Massachusetts and Michigan show that it will live where the temperature falls to 20 degrees below zero (F.).

Bald cypress lives to a great age. In the virgin forest, trees 400 to 600 years old are numerous, and old gray-beards from 750 to 1200 years of age are not difficult to find. These old native trees grow very slowly, but

when cypress is given favorable conditions for development, such as on cut-over lands or in the open, both diameter and height growth are found to be moderately rapid and well maintained. The average diameter increase in such cases varies from $1\frac{1}{2}$ to 3 inches in 10 years. The average height growth up to about 100 years of age is about 1 foot per year, the rate being considerably more rapid during the first fifty years than after. Few coniferous seedlings grow so vigorously from seed during the years of infancy. Cypress seedlings reach a height of from 8 to 14 inches the first year and 16 to 24 inches the second year. Cypress also possesses the ability to heal wounds in the bark at a rapid rate. So strong is this power that stumps 2 feet in diameter are occasionally found that have healed over and are still alive several years after the tree has been cut, although without producing sprouts.

About 1770, John Bartram planted a small cypress sapling which he is said to have pulled in the swamps of Florida and brought home in his saddle-bags. The tree has been dead for many years, but its skeleton still stands in Bartram's garden in Philadelphia. In the century and a quarter of its growth the tree attained a height of more than 150 feet and a diameter of 7 feet. The vitality of the bald cypress is illustrated by a tree which stands at the corner of 13th and Locust streets, Philadelphia. This tree is about 60 feet high and more than a foot in diameter, and is apparently in perfect health, although long exposed to the smoke and dust of the city. Except an opening less than 30 inches square, where the tree stands, every foot of soil the roots can reach is covered by brick sidewalks and asphalt paving.

The trunk is unprotected and shows numerous scars where horses have gnawed it, but each time it has rapidly healed its wounds. It is surprising that any tree can maintain itself in thrifty condition under such extremely adverse conditions.

The attractiveness and vigor of bald cypress undoubtedly will cause it to be planted much more extensively for ornamental purposes than it has been up to the present time. It is hardy as far north as Massachusetts, New York and Michigan, and has no insect enemies. It should be planted in deep, fine sandy loam where moisture is plentiful and drainage good, if it is desired to secure rapid growth. It does fairly well in dry situations on the heavier soils and will also grow when planted in swamps or even in shallow ponds; in the latter case the roots send up the curious "knees." Bald cypress should also prove a valuable tree for commercial forest planting, especially



CYPRESS ON LAKE DRUMMOND IN THE DISMAL SWAMP

Cypress inhabits permanent swamps much too wet for agriculture and most other uses, except when drained. The present logging of cypress is attended by difficulties of a kind unknown in handling any other commercial timber. The bulk of all cypress is now logged by massive steam machinery moved from place to place on railroads built into the deepest parts of swamps over soft and treacherous ground. Another method is called pull-boat logging. The pull-boat has a stationary engine mounted on a float or barge and it skids the cypress over the soft surface for distances up to 2000 feet or more. The dredge-boat, working just in advance of the pull-boat, digs canals to give access to cypress where natural channels are lacking. Another method of logging is by the overhead skidder, in which the logs are brought in by a carriage traveling over a powerful cable suspended between the "head tree" and "tail tree," usually 600 feet apart. It is the general practice to girdle or "belt" cypress trees from 6 months to a year in advance of logging. The result is that about 95 per cent of the logs will float instead of 10 to 20 per cent.

on sites where it is too wet for other species to thrive. On a good class of hardwood soils, experience in Ohio seems to indicate that the tree will grow with sufficient rapidity to warrant its being used quite generally. Under cultivation the trees grow from 18 to 24 feet in height in the first 10 years. It is not difficult to raise the seedlings provided the seeds are soaked in water for about a month prior to sowing. They should be sowed about the middle of June and afterward the seed-bed should be kept mulched and well watered.

The wood of bald cypress ranks between white pine and the hard yellow pines in weight, strength and stiffness. The lumber shrinks and swells to a limited extent

and is moderately hard, straight-grained, and usually fine-textured. The color of the heartwood varies from light to dark brown or nearly black and gives rise to the common names of "red" and "black" cypress. The sapwood is white and decays rapidly. "White" cypress comes from trees which are mostly sapwood, and lacks the wonderful durability of "red" or "black" cypress. "Pecky" cypress is caused by a fungus which honeycombs the heartwood and eventually causes the tree to become hollow. This fungus works in any part of the tree but is most prevalent in the upper portions. The holes and pockets formed in the woody tissues weaken the lumber but appear to make it even more resistant to decay than the sound wood. The fungus which causes "pecky" cypress does not work in the sapwood, and so does not kill the tree, but because it weakens the heartwood the tops are often badly broken by storms.



THE LASTING QUALITY OF CYPRESS

This interesting testimonial to the durability of wood stands in the yard of St. Michael's Church, in Charleston, South Carolina. It is a head-board of heart cypress, erected in 1770, nearly 150 years ago. Marble tombstones often decay in less time. In all these years, the only repair has been the replacement of the post to the right in the photograph, which was necessitated because the original post was splintered by a shell from one of Gilme's guns on Morris Island, fired during the siege of Charleston in 1863-1865. This chance shot split off the upper part of the head-board, on which was carved the words "In Memory." The outlines of the original letters cut into the wood are still perfectly sharp and clear, and the monument will apparently endure for many years to come.

Commercial Uses of Cypress

TEN years ago cypress was "lumber." It was used largely by the factory trade in the manufacture of wooden ware, doors and interior trim. Almost over night it ceased to be lumber, a piece of wood of specified dimensions, and became cypress, "The Wood Eternal." That descriptive title was coined when first it was decided to tell the public about the merits of cypress and came freshly minted from the phrase factory. It was apt and catchy. Cypress was the first wood to be advertised nationally. The work was taken up in a broad, constructive way. It was not suggested that home owners buy cypress and "make something, just anything you wish to make," but that definite plans for improving, beautifying or making the place more comfortable be adopted, and that cypress be used for the very specific and definite purposes for which it was recommended. The dominant idea was to interest home owners in the intelligent use of cypress. For these reasons a present-day consideration of the uses of cypress must take into account the intelligent manner in which the wood has been placed before the world's lumber-using public.

Going back into the history of wood, the investigator finds that the oldest doors in existence are made of cypress. They are now in a serviceable condition, although more than a thousand years old. Perhaps the youngest door in existence also is made of cypress, for the beauty of the wood is commanding the attention of the building trade. The significant fact is that both the modern and the ancient employed cypress to meet this exacting need, and no other purpose for which wood is used requires such absolute living up to expectations.

Selections of wood for use by those who invade a forested country are easily and quickly made. Hardy pioneers who clear away the forested area to the end that they may engage in agriculture examine carefully the

relative condition of the "dead and down" timber. In the cypress section of the South the pioneers were quick to note the sound condition of the cypress that had laid on the ground for hundreds of years. They figured, as a matter of course, that if cypress would last almost indefinitely under such adverse conditions, it would be an excellent material to use in building homes, fences, barns and out-houses for themselves. Cypress, therefore, long has been the main dependence of the South for shingles, fencing material, residences and farm buildings in the country in which it grows. The product was greater than required for home consumption and naturally the manufacturers of cypress lumber reached out for other markets. Cypress shingles and cypress "shop" were marketed in northern centers of lumber consumption a quarter of a century ago. This invasion of the North was made possible by reason of the fact that cypress was cheap and, "lumber being lumber," it was possible to find an outlet for a part of the surplus of the southern mills.

This demand continued in an intermittent fashion, the quantity sold being governed largely by price competition. In the St. Louis market, for example, cypress was used extensively by manufacturers of interior trim. This condition arose during the transitory stage, 1898 to 1908, during which the main source of lumber supply shifted from the North to the South. The production of northern lumber decreased steadily during that decade and the output of southern lumber increased.

Co-incident with the increase in the territory in which cypress was marketed, there was a big gain in the price of cypress timber values. Locally, up to that time, the timber had been regarded as without value or of nominal value only. A certain "wise southerner" once upon a time unloaded a cypress swamp on an unsophisticated northerner for the unbelievably high price of \$5 per acre.

A few years later the northern gentleman, who understood timber values, sold his "worthless swamp" for \$75 an acre and the disgruntled man who originally had told with gusto how he had "soaked the smart alec from the North" brought suit but failed to recover. Twenty years ago cypress timber was valued at 50 cents and up to possibly \$5 per acre. Now the stumpage is worth about \$10 per thousand feet and some of the swamps are covered solidly with cypress and will produce 20,000 or more feet to the acre. The increase in timber values coupled with the heavy cost of logging and manufacturing necessitated the adoption of intelligent methods of marketing.

A demand sufficiently broad to take the product at a profitable price was demanded by the producer. The only way to assure that demand was to retain established trade and create a confidence in cypress that would increase the call for it for new uses. It was relatively easy to mentally arrive at that conclusion. It was a different and more difficult matter to work out the problem encountered. Those in charge of the work resorted to the first principles of merchandising, viz.: "It is easy to sell what people want." The real problem was to make them want cypress. Admittedly it was impossible to interest the public by advising its component members to buy cypress boards. However, the idea of buying a few cypress strips with which to make a trellis for a flowering vine to clamber over and increase the beauty of the premises aroused instant attention and brought immediate response.

There followed suggestions for pergolas, trellises, sleeping porches, arbors, garden benches and similar necessities and conveniences. Then came definite, tangible suggestions for bungalows, neat, comfortable, attractive homes instead of stiff, conventional

enclosures, formerly called homes. The whole intent and purpose of this campaign of publicity on behalf of cypress was to educate the public to the advantages to be gained by the intelligent use of cypress in beautifying, adorning and improving their homes. The beauty of garden benches and trellises, the comfort and satisfaction derived from sleeping porches and pergolas, the idea of making a beautiful home as well as one that was comfortable, were intimately and indelibly linked in the public mind with the use of cypress.

The next step in the development of a permanent market was the suggested use of cypress in farm buildings. Plans of all manner of farm structures, residences, barns, implement-sheds, hog-houses, poultry-houses, sheep-pens, greenhouses, gates, fences, and other building equipment for the farm, were distributed to those interested. This was one of the first serious attempts made to interest the farmer in better buildings, and as-

sociated with the idea of the proper class of buildings was that of using wood that would be economical because of its durability. At the proper time came the idea of a cypress silo, made according to plans that permitted of the use of regular retail yard stock. Cypress was recommended because of its durability, that is, its ability to withstand the effects of alternate wetness and dryness, and because cypress is not adversely affected by the acids in the silage.

This was a step along the upward path in farm building and in the work of developing a market for the products of the cypress mills. A final touch was given when plans and instructions were issued for the construction of homemade furniture and knick-knacks, humidors, clothespresses, trays, and similar articles. Such articles, it was recommended, were to be given the famed "sugi," or Japanese drift-wood finish, using a blow-torch to char the soft portions of the wood and a wire brush to finish the work. Interesting thousands in the



EARLY EGYPTIAN CYPRESS DOOR



NEW ORLEANS CYPRESS WATERPIPE
Laid in 1798. Removed in 1914.



A SUGI-FINISHED CYPRESS HUMIDOR

manufacture of presents for loved ones, and at the same time familiarizing them with the beauties of "sugi-finished" cypress, was a stroke in business diplomacy seldom equalled.

The outcome has been the discriminating use of "sugi" finish for trim, mantels and other interior woodwork. The word "discriminating" is used advisedly because that treatment is recommended and should be employed only where it is suitable. The outcome of applying intelligence to the problem of marketing cypress can be found in almost every village and hamlet in the United States and in thousands of markets and homes in foreign countries. Cypress is known, its merits appreciated, its uses understood.

In a complete and very interesting publication on the southern cypress (Bulletin 272, U. S. Department of Agriculture), is given the following comprehensive statement regarding its uses:

"Cypress has a great variety of uses, and for many of these it is selected as a preferred material. The key to its usefulness is its resistance to decay and other forms of deterioration when in contact with moisture, and its quality of being easily worked. It is used extensively for outside finish of buildings, such as siding, casing, sashes, doors and blinds, cornice, railings, steps and porch material. As a gutter stock, cypress outlasts many other materials and is in favor for high-grade work. Standard planing products consume large quantities of cypress. These include ceiling, siding, flooring, molding and finish. On account of its freedom from taste and great durability, it is a preferred material for tanks, vats, tubs, and wooden buckets. These are used for water storage, and by creameries, breweries, bakeries, dye works, distilleries, and soap and starch factories. In the construction of greenhouses, where wood is subjected to extremes of heat and moisture, cypress is used probably more than any other wood. It is also a leading wood for pumps, laundry appliances, caskets and coffins. Cypress is extensively used throughout the South in the construction of picket fences, which there remain the



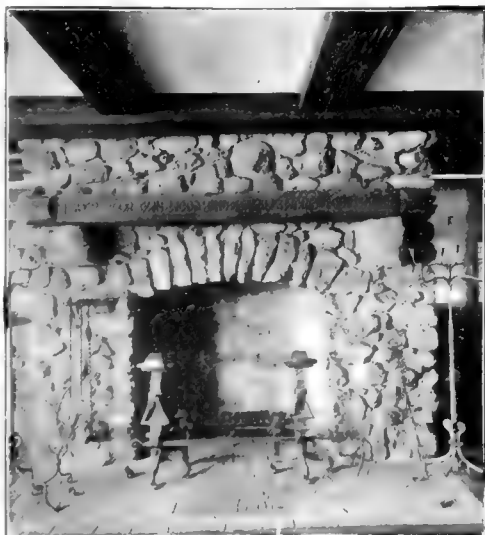
MODERN DOOR MADE OF CYPRESS

standard form of yard fence. In the moist, hot climate of the South, split cypress shingles have outlasted all other roofing materials commonly used, except the best grade of slate and tiles. While the ordinary sawed shingle is very durable, the relatively high value of cypress wood has resulted in cedar taking the lead as shingle material.

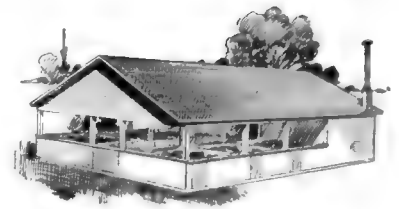
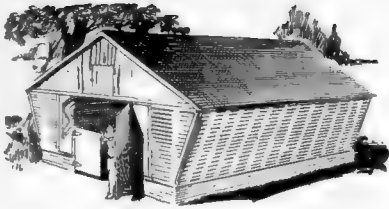
"More than two-thirds of the total cypress lumber output, estimated in round figures at 740,000,000 board feet in 1914, is further manufactured and utilized by the wood-manufacturing industries in the United States. The reports for 1911 show that 68 per cent (668,353,342 board feet) of the amount cut in that year was so used by these industries. The balance of the lumber cut goes into general use in the retail market.

"Relatively small amounts of cypress go into the primary products other than lumber. In 1911 the electric and steam railroads purchased cypress cross-ties to the number of approximately 5,800,000 or about 4.3 per cent of the total for the year. Only 72,995 cypress poles were reported purchased in 1911 by all the principal classes of pole consumers. Small amounts go into cross arms. A little is used for slack cooperage, and, experimentally, cypress has been found to be a substitute for white oak for wine barrels."

Cypress wood contains a natural oil which apparently checks the action of decay in much the same way that creosote does when injected into ties. Cypress heartwood has been known to outlast stone, iron and cement. In



CYPRESS "PECK" BEAMS
In the living-room at Henry Ford's residence.



TYPES OF FARM BUILDINGS FOR WHICH CYPRESS IS PARTICULARLY DESIRABLE

cent efficient remain monuments to his industry and somewhat hasty notions of architecture. The story of cypress values and cypress uses is being told every day on the

farm, in the suburb, in the city home and in the thousands of factories whose products call for the use of wood upon which dependence may be placed.

BOY SCOUTS IN CITY PARK WORK

By H. H. TRYON

Instructor in Forest Utilization, New York State College of Forestry

THE Park Commission of Syracuse, New York, had for some time been confronted with the problem of how to develop Westminster Hill, a steep little knoll located in the University Hill residence section and which, on account of its topography, is not suitable for building purposes. A solution was found by enlisting the help of local Boy Scouts and the New York State College of Forestry. Five thousand forest trees were supplied from the College nursery; these were chiefly red and white pine, twice transplanted, with about 300 Norway spruce, also twice transplanted. This stock was brought in from the nursery the night before and was wheeled in near the scene of action. In the morning, 75 Scouts began the work of foresting the slopes of this hill. Mr. S. W. Allen of the Forestry College was in charge, assisted by several other members of the Forestry faculty.

The spruce was put in in a border along the base of the hill to insure its having a generous supply of moisture, while the upper area was filled in with the red and white pine. At the suggestion of the Park Commissioner, the trees were not planted in rows but an irregular arrangement was followed, care being taken that spacing was always from 5 to 6 feet. The scattering or "shot-gun" scheme of planting, such as this, was, of course, adopted in view of the fact that the plantation was not being set out for any commercial purpose but rather for its future value as a playground and recreation park.

The method of planting was the usual one; mattocks were used to dig the holes, the sod being first scraped off. The bulk of the Scouts were detailed in crews of two, one to dig and one to plant. The remainder were apportioned to "puddling" the trees, keeping the planters supplied with stock, and last but not least, a small detachment was kept busy bringing fresh water for the thirsty ones.

At noon work was stopped and the Scouts divided into groups, each one with a small cooking fire at its center, by means of which they prepared their meats, roasted their potatoes, made cocoa, etc. For a short time after dinner, Scout games were played, then planting was resumed until

all the area was covered. It is safe to say that these few hours of labor have assured to Syracuse at some future date an attractive wooded park in the center of one of



BOY SCOUTS PLANTING A HILLSIDE

Syracuse, New York, solved the problem of how to develop a steep hill overlooking the city by getting the Boy Scouts to plant it with red and white pine and Norway spruce.

its principal residence districts. Those who planted the trees expect that at least 70 per cent will survive; and if grass fires can be kept out, the existence is assured of a grove of trees whose intrinsic value will be inestimable.

DYES FROM ORANGE WOOD

DU E to the investigations of the Forest Products Laboratory at Madison, Wisconsin, the manufacture of dyes from the waste of osage orange wood has become a commercial success. Carloads of the wood are now being shipped to eastern extract plants from Oklahoma and the dye is now produced at the rate of about \$750,000 per year. Previous to the establishment of this industry, the waste of the osage orange wood had no market value and the extract plants were importing dye woods from Mexico and Central America at a very high cost.

Crater Lake National Park

BY MARK DANIELS

Former Superintendent of National Parks

MANY people whose repugnance for platitudes is not sufficiently strong to prevail against their indifference to the value of an extensive vocabulary will describe Crater Lake as the eighth wonder of the world and let it go at that. To many others, myself included, it is the whole eight, and then some, if one may be permitted to resort to the more expressive vernacular. The sight of it fills one with more conflicting emotions than any other scene with which I am familiar. It is at once weird, fascinating, enchanting, repellent, of exquisite beauty and at times terrifying in its austere dignity and oppressing stillness. In the sparkling sunlight, its iridescent hues are dazzling and bewildering. When a storm is on, it throws terror into the heart of the observer and carries the mind back through the eons when it was born in Titan throes of nature. There are a few other crater lakes in the world. In India, Hawaii and Italy there are some;

perhaps there are others in other lands, but there is none known to man that can remotely approximate the transcendent beauty of Crater Lake in Crater Lake National Park.

To appreciate how one might be so profoundly impressed by a visit to the Lake, it is necessary to know something of the country and its formation. The Cascade Range of mountains in southern Oregon, in the vicinity of Crater Lake National Park, forms a more or less broad plateau, broken here and there by peaks and volcanic cones that tower above the surrounding territory. Of these majestic mountains, Shasta, Hood and Mount Rainier form the three most striking and distinctive peaks. At one time, however, many thousands of years ago, Mount Mazama was probably as high and as distinctive in appearance as Mount Rainier. Long before any human being ever set eyes upon the Peak, however, the top



A BEAUTIFUL VIEW OF CRATER LAKE

When the sun is shining brightly, the trees will be found growing. From the rim and points lower down, views of the Lake and the tawny cliffs beyond make a wonderful background, against which the deep greens of the pines and cedars are silhouetted.

broke through and sank into a great subterranean chasm beneath the mountain, leaving the cup, which now contains Crater Lake, to be filled with the waters of springs and melting snows. As the volcanic fires of Mount Mazama gradually cooled and finally ceased, the great basin was filled to its depth of two thousand feet with water which has, during the ages, taken on a blue, the hue of which is deeper and more intense than the blue of the Bay of Naples.

There is no inlet to the Lake nor is there any surface outlet. It is supposed that the waters escape by underground channels and contribute their bit to the flow of

impression is largely due to the way it bursts upon the view. All the way from the railroad station to the Crater's rim the road climbs and climbs with the objective ever far above and out of sight. When the motor stage finally pulls up at Crater Lake Lodge, the entire panorama bursts into view with a theatrical suddenness and presents such a striking contrast to anything that has been seen en route that it takes some time to readjust the faculties. The approach to the Lake is almost calculated to bring the mental attitude of the tourist to a condition that is most susceptible to the suddenness of the change of scene.

There are two main routes which may be traveled in



HERE IS REACHED PERFECTION IN REFLECTIONS

As Joaquin Miller says, when the surface of the Lake is undisturbed, it is difficult to distinguish the reflection of the cliffs from the cliffs themselves. The perfection of these reflections is due not only to the surface of the water, but to the curious intense blue which seems to give it more of a mirror-like quality.

the Klamath River, but whether this may be so or not, the average annual level of the surface of the Lake remains substantially constant. The water level is at an elevation of sixty-one hundred and seventy-seven feet above the sea and the mirror-like surface is unbroken except for Wizard Island and a jagged bit of rock called the "Phantom Ship." The Lake is between five and six miles in diameter and almost circular in form. The surrounding rim is as near vertical as the soil can stand and towers from eight hundred feet to eighteen hundred feet above the water surface.

The reason that Crater Lake leaves such a lasting

impression is largely due to the way it bursts upon the view. All the way from the railroad station to the Crater's rim the road climbs and climbs with the objective ever far above and out of sight. When the motor stage finally pulls up at Crater Lake Lodge, the entire panorama bursts into view with a theatrical suddenness and presents such a striking contrast to anything that has been seen en route that it takes some time to readjust the faculties. The approach to the Lake is almost calculated to bring the mental attitude of the tourist to a condition that is most susceptible to the suddenness of the change of scene.

There are two main routes which may be traveled in

entering and departing from the Park, one by the southern entrance by the way of Klamath Falls and Chiloquin, and the other by Medford through the western entrance. These two routes make it practical to enter the Park, traverse it, and depart while en route either north or south between San Francisco and Portland or Seattle. In this respect, a visit to the Park may be taken, without seriously interrupting the travel, much in the same way that one may enter Glacier Park, traverse it, and emerge at another station on the line of the Great Northern. Northward bound, the tourist may leave the main line of the Southern Pacific at Weed and take the branch road

along the wonderful Klamath Lake to Chiloquin. From Chiloquin a motor stage will carry him to and through the Park and out by the Medford road. At Medford, on the main line of the Southern Pacific, he may continue his northward journey. The south-bound passengers may take just the reverse route.

In times gone by, not so many years ago, despite the fact that officials of the Southern Pacific Company place the date in the Dark Ages, the northward bound passengers visiting Crater Lake National Park were accorded the privilege of waiting four hours at Weed, where the sun daily gives evidence of its ability to raise blisters and remove outer layers of skin without human aid. The train from Weed on the branch line to Klamath Falls and Chiloquin would, in those days, start out in the cool of the evening from Weed and leave the traveler either at the town of Klamath Falls or Chilo-

quin for the night. This unnecessary delay at Weed has since been eliminated and the traveler is given some opportunity to see the wonderful Klamath Lake before the evening shadows set in. Whether this change in schedule has been due to the subtle sarcasm of the free-spoken among the travelers who suffered this long delay or whether Mr. E. O. McCormick, vice-president of the railroad company, has again succumbed to his natural tendency to do the best he can for the traveling public on his railroad, is difficult to say. In extenuation of the latter's case, however, it may be only just to say that the

substitution of oil for coal as a fuel on the Southern Pacific is largely due to his efforts, and it is to be hoped that the votes of thanks from those who wish to enjoy the scenery without the obstruction of cinders in the eye may offset the curses of the oculists who formerly thrived along this line when coal was used.

If the stop is made at Klamath Falls, it is possible to take a most wonderful ride along the western shores

of Upper Klamath Lake, some twenty miles in extent, to Harriman Lodge and Pelican Bay. I have known few people who have chosen this route who did not stay a night at Harriman Lodge.

From Harriman Lodge the road to Fort Klamath passes through some wonderful forests and charming scenery. From Fort Klamath it follows along the western side of Anna Creek and enters the Park at the intersection of the Anna Creek canyon with the southern boundary line.

From the southern en-



TREES AND ROCKS AND WATER AT CRATER LAKE

Even the trees of the vicinity take on characteristics of the rugged Crater. They seem to throw their branches out in picturesque lines that make perfect composition with the broken and jagged cliffs.

trance for about five miles the road follows the rim of the canyon and discloses at almost every turn wonderful glimpses of the canyon walls and the stream several hundred feet below.

The snows cling to the higher levels around the rim of the canyon for so long a period that at times it is difficult to drive to the rim until quite late in the season. As a result it has been necessary to establish the Park headquarters at a place called Anna Spring which is at an elevation of six thousand feet above the sea. The headquarters here are at the junction of the Medford

road and the Anna Creek road. From the Superintendent's office to the rim of the Crater, the road climbs through a difference in elevation of a little over one thousand feet and lands the passenger at the very door of the Crater Lake Lodge on the rim. Throughout the entire trip the colors have been the sombre shades of our Oregon forests and the rich browns of the fields, but from the rim an entirely different color scheme bursts upon the view.

The color of the water is a blue that defies description. It is of a sapphire shade and yet seems to be translucent and sparkling. The cliffs that form the rim are of rich browns and tawny yellows, spotted here and there with deep reds. At the edge of the Lake, in places where the water is shallow, the yellow of the lava beneath shows through the blue of the water and gives this sapphire sea a border trim of pale jade

green against which the deep rich green of the cedars and pines is brought out in most startling contrast. A friend who just returned from there told me that he was never so thrilled with conflicting emotions as at the moment he first stood upon the rim of the Crater.

Nearby stood a small boy, who, just as my friend secured a vantage point, loosened a stone that went rattling down its fourteen-hundred-foot journey to the water below. My friend is a great lover of children, but he said that at that moment he had a burning desire to throw the small boy after the stone. First he wanted to leave the place, for he felt that all human things were strangely out of harmony with the scene. Then he felt a sudden and ardent desire to rush down the steep precipice and bathe in the magic waters of the Lake. Then he felt sick and then hungry. He never told me the entire

gamut of his emotions nor which one he finally succumbed to, but I am inclined to believe, from my knowledge of his habits, that hunger won out and he finally wound up with a mess of crisp trout from the Lake.

Of all places to fish in still water, there is probably none that equals Crater Lake. The water, despite its deep blue color, is astonishingly clear, and objects may be seen on the bottom of the Lake, in places where it is

shallow, forty or fifty feet below. Around the rim there is no form of plant or tree life that may entangle the line or catch the hook of the unskilled fisherman. One may stand on the brink of the Lake and cast, without fear of snares, for the trout which may be frequently seen in the depths below. On a still day the wily fish may be seen to dart from the deep shadows behind some boulder and rise like a flash to strike at the fly on



A GIANT ARROWHEAD

There is a comparatively small and jagged rock projecting above the glass-like surface of the Lake, which, at certain angles, takes on the aspect of a great ship. Combined with its reflection, which at times is difficult to distinguish from the rock itself, it looks like a giant arrowhead. The picture here shown is taken from a point on the eastern rim and looks toward the Vidæ Cliffs.

the surface. If the angler is sufficiently skilful to fasten the hook firmly, he will see every move of the fish in his struggles for escape. The trout in the Lake are mostly rainbow and of considerable size, varying from a half pound to four pounds in weight, and they are plentiful in number. The average weight, I would say, is in the neighborhood of one and a half pounds. The work of landing them is, therefore, something of a task, for they put up a beautiful fight. Anyone who has not enjoyed the experience of being able to see every move of a two- or three-pound rainbow trout while he is being landed has not enjoyed to the full the fascinating sport of angling.

The lure of the Lake below frequently tempts inexperienced travelers to make the descent in the afternoon as soon as they have changed and refreshed themselves after the stage ride. Until the new trail was built last

year leading from the rim to the water's edge, such careless little trips frequently proved disastrous, for the return climb was then very arduous, covering as it did nearly a thousand feet of difference in elevation. Standing on the rim, the descent to the Lake seems to be little more than a short walk of ten or fifteen minutes. Coming back over a poorly-constructed trail, the thousand-foot climb lengthens in a most astounding manner. One of the first steps taken, when the measures of Secretary Lane were adopted for the development of the Parks, was the construction of a practical trail on easy grade from the rim of the

crater to the water's edge. This is now complete and greatly reduces the labor of the trip, although the climb is still much more than it seems.

Crater Lake has been more successful, considering its area, than other parks in the system in securing appropriations from Congress for its improvement and development. Congress is committed to a plan for building an encircling highway around the rim of the Lake as close to the brink as practical construction will admit. The two roads, one from the southern entrance and one from the western entrance, which are now completed, are a part of the road scheme for the development of the Park to which Congress has given its consent. Whether the Appropriation Committee was caught in a moment of mental aberration when this plan was put through, or

whether they were led to see the light which again seems to them so dim, cannot be definitely ascertained, but the people of southern Oregon, and, in fact, all who love the scenery of our country, are particularly grateful and

delighted over the fact that Crater Lake will soon present a wonderful field for motor touring.

After the journey from the railroad station to the Lake has been successfully weathered, there is quite enough of interest, not only in the scenery immediately about the Lake and crater rim, but in other parts of the Park, to justify a stay of several days. A good motor-boat is kept at the

landing down on the Lake's edge, and a trip around the borders of the Lake in this boat is perhaps one of the most fascinating experiences that can be had. The boat passes around jagged points of sharp rock, under the shadows of beetling cliffs and out into the sunlight again in a way that makes one feel as if fairyland were really true. In places where the water is not more than thirty or forty feet deep, the jade-green lava at the bottom can be clearly seen. In other places the boat over the rim of the inner crater, and the suddenness with which the bottom seems to drop out of things, is breath-taking. The

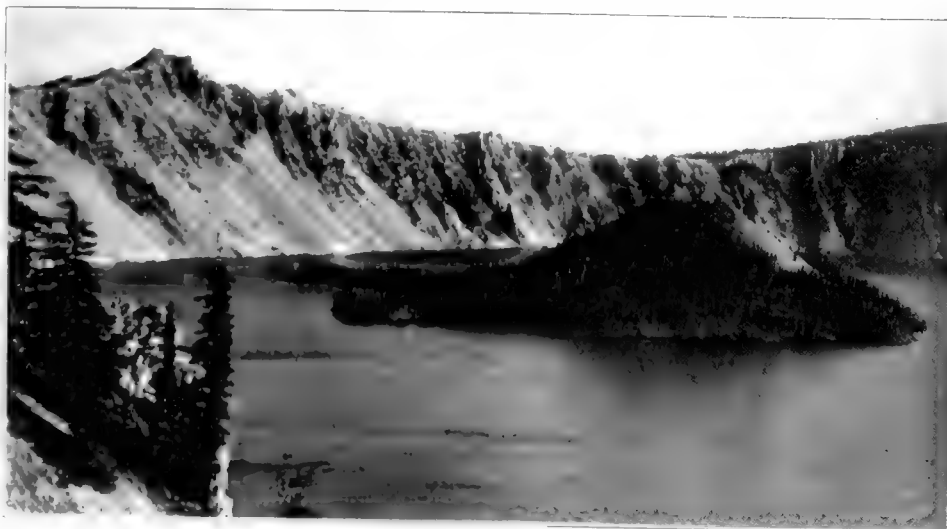
trip around the border of the Lake is some twenty-four miles in length and every foot of it is full of fascinating interest. A very popular way of spending a little time at the Lake is the trip to Wizard Island and a stay there over night.

Wizard Island is about three-quarters



"THE PHANTOM SHIP"

A close view shows its rugged outline and mast-like rocks. From this position, however, the similarity to a ship is not so readily visible.



WIZARD ISLAND, CRATER LAKE

This is the cone of a secondary crater that was thrown up in the great cup formed by the fall of Mount Mazama, at least so the authorities of civilization say. The Indians, however, still hold steadfast to the belief that it is the head of the great god Llaoc.

of a mile in length and one-half mile in width and its top is approximately eight hundred feet above the surface of the Lake. Geologists and others who read the story of the world's history in stones and formations and things say that Wizard Island is the remains of a secondary cone that was built up in the great crater. It is partially covered with pines and presents a somewhat weird and desolate aspect when viewed from the rim. The lack of trees on the top gives it a bald appearance that suggests the possibility that Llao, the mythological character whose head the Indians supposed the Island to be, might have belonged to some Christian religious order.

Klamath and Modoc Indians in the old days believed that Mazama and the surrounding country comprised the home of the good god Llao. To fight his battles he had a tribe of great crawfish which kept the rim of the Lake clear of curious investigators by reaching out of the water with their claws and snuffing out their lives much as the Japanese snuff the wicks of their candles with copper pinchers.

Nearby was another god, named Skell, who was lord of the marshes of Klamath. As is usual, when two gods get close enough to develop any degree of intimacy, war broke out between Llao and Skell. Llao, in a fit of playfulness, carved out the heart of Skell and tossed it to his monster crawfish, who used it to play ball with. Skell, however, had many faithful servants, such as eagles, bears and deer, and one day an eagle secured Skell's heart in flight and passed it on to a deer, who ran away with it. Skell's body then grew around his living heart again until he became whole, and stronger than ever, thus disproving the modern contention that a man can't come back. When he was recovered from his wounds, if removal of all the body except the heart can be described as wounds, he started the scrap all over again, and this time captured Llao and tore his body into fragments on the top of the cliffs of Crater Lake. When he threw the fragments into the Lake, they were eaten by Llao's own monster crawfish, who thought, of course, that it was Skell's body, but when the head was thrown in, they recognized their mistake and refused to eat it, escaping by a narrow margin

the everlasting stigma of being termed wilful cannibals. Wizard Island is Llao's head, and every Indian who knows the legendry of his tribe will prove it to you, because just to the north of the Island and a little to the east is Llao's rock, which towers almost nineteen hundred feet above the water's surface, and no one could wish for better proof than that, for it was from Llao's rock that the head was tossed into the Lake.

The trips of interest in the Park are not confined to the Lake itself. There are the Anna Creek Canyon, which is well worth investigating, the climb of Scott Peak for a view, and the Pinnacles in the Sand Creek Canyon. These Pinnacles are rugged, towering cones that project like stalagmites from the floor of the canyon or from the lower slopes to the walls, that remind one somewhat of the formations that are so common in Yellowstone. The Pinnacles are almost at the eastern border of the Park in the upper portion of the Sand Creek Canyon. Sand Creek heads in Anderson Spring near the upper end of Kerr Valley and joins Wheeler Creek just outside the Park. It has one tributary just inside the Park, the headwaters of which are on the south slope of Scott Peak. Here is a wonderful collection of names given to some



THE SENTINEL IN CRATER LAKE

The bottom of the Lake in most places pitches off at such a steep angle that it is quite possible for the motor-boat to hug in close to the surrounding rocks and cliffs. This remaining sentinel of a by-gone period is invariably visited by the motor-boat.

of the interesting places that cluster around the base of what was once the Great Mount Mazama. In addition to these, we have Dutton Cliff, Dutton Ridge, Scott Bluffs, Anna Creek, Ragged Crest (which is really the name of a portion of the rim) and a great many other similarly inspiring names that testify to the quality of intelligence possessed by those who had the naming of these places.

Continuing the trip as it was begun, namely by entering from the south, that portion of the road lying between the Park Headquarters and lodge must be retraced. From the lodge there is a beautiful stretch of road following down the comparatively gentle slopes of the plateau through a forest of pine, fir and cedar, nearly all the way to Medford, Oregon. There are few motor trips in this country that are equal to the drive down this road to Medford, which is somewhere in the neighborhood of eighty miles from the Lake. The course of the road is

substantially westward, and in the afternoon the play of the shadows and the light of the setting sun is truly a spectacle to behold. The road traverses gentle slopes and long stretches of forest-covered meadow-land where the traveler is constantly between the twilight walls, and then bursts out suddenly on to a slight eminence where the



THE PINNACLES

These are in the Sand Creek Canyon. They are stalagmites that tower above their bases near the bottom of the Canyon to the very rim. They are perhaps as interesting as anything that may be found in Crater Lake National Park outside the Crater's rim.

full red disc can be seen hovering over the tops of the green forests that stretch indefinitely into the distance.

Whether the construction of the new cut-off of the Southern Pacific, which will give an entrance to the Park on the east that will be very much closer to the Lake, will keep many from taking this wonderful drive, is a question, but, no doubt, it will. Nevertheless, if I ever take another trip to Crater Lake, one of the features of the journey to which I will look forward will be the ride from the crater rim in the afternoon down the slopes of the great plateau to Medford.

After all is said and done, the task of writing a description of Crater Lake is one that should be essayed only by master hands at description. A sentence in the account of J. W. Hillman, who was the leader of a combined party of Californians and Oregonians who discovered the Lake, gives an excellent idea of the suddenness with which it bursts on the view. He writes: "Suddenly we came in sight of water. We were much surprised, as we did not expect to see any lakes and did not know but that we had

come in sight of and close to Klamath Lake. Not until my mule stopped within a few feet of Crater Lake did I look down, and if I had been riding a blind mule, I firmly believe I would have ridden over the edge to death." Joaquin Miller, the "Poet of the Sierras," has described the impressions engendered by the Lake perhaps as briefly and potently as any. He says: "The Lake? The Sea of Silence? Ah, yes, I had forgotten—so much else; besides, I should like to let it alone, say nothing. It took such hold on my heart, so unlike Yosemite, Yellowstone, Grand Canyon, when first seen, that I love it almost like one of my own family. But fancy a sea of sapphire set around by a compact circle of the great grizzly rock of Yosemite. It does not seem so sublime at first, but the mote is in your eye. It is great, great; but it takes you days to see how great. It lies 2,000 feet under your feet, and as it reflects its walls so perfectly that you cannot tell the wall from the reflection in the intensely blue water you have a continuous unbroken circular wall of 24 miles to contemplate at a glance, all of which lies 2,000 feet, and seems to lie 4,000 feet, below. Yet so bright, so intensely blue is the lake that it seems at times, from some points of view, to lift right in your face."

Crater Lake has not enjoyed the fullest attention, appreciation and knowledge of its beauties that its unique distinctiveness justifies, but if ever the Federal Government gets the present well-planned campaign of publicity for its scenic areas thoroughly under way, this Park is destined to be the mecca of scenery-loving tourists.

A GLOWING TRIBUTE

MR. C. F. Williams, of the Royal Mint at Sydney, Australia, writing Mr. Charles Lathrop Pack, President of the American Forestry Association, says:—

"I must again pay a compliment to the publishers of AMERICAN FORESTRY which a friend has so kindly sent me. It is a grand production, which speaks volumes for the photographer responsible for such wonderfully fine samples of the photographic art; indeed, one might with justice say, 'it is a scientific story of a gloriously interesting subject, told most eloquently in the best approved style.' I was further deeply interested in your remarks, under the heading 'Preparedness and Forest Products,' if you will permit me to say so? I believe the American Forestry Association, as well as all true Americans interested in the future welfare of their country, owe you a debt of gratitude for the splendid advice contained in your remarks under that heading which were, and are, admirably put without wasting words. It is up to all interested to seize the opportunity now at hand."

THE State of Pennsylvania has started a new attack on the chestnut blight, the white pine blister rust and other tree diseases by going to Wisconsin to engage J. G. Sanders, Wisconsin State Entomologist, whose first step for the eradication of the white pine rust in Wisconsin was to destroy all the trees and berry bushes on the island where the disease was found.

Fighting a Forest Fire

BY JAMES BROWN, *Forest Clerk*

THE hot, dry weather which prevailed in the timbered portions of Arizona and New Mexico throughout the spring and summer has been very disastrous in the way of forest fires. The National Forests, dry as tinder, with high winds blowing every day, required only a lighted match or cigarette to start huge conflagrations.

This one happened on a lonely trail in the Horsethief Basin country of the Prescott Forest. On a Friday smoke commenced boiling up from one of the rocky, tree-covered canyons. It was quickly spotted by the Forest Service lookout men from high peaks for miles around, and a forest ranger with a crew of six men was soon at the fire. They fought the fire all day and night and thought they had it under control. Saturday night, however, a strong wind came up and whipped the fire in all directions. More men were hurried to the fire line, but Sunday a fiercer wind sprang up and the fire got away in four directions, burning up the mountain sides like millions of Turkish cigarettes. A hundred men were rushed from the mining town of Crown King to the fire lines. Sunday night, Monday and Monday night it was a hard battle between the men and the crackling flames for mastery. Scores of men never left the fire lines except for meals.

Equipped with rakes and shovels, some of the fighters cleared fire lanes to head off the fire, while brawny men from the mines leaped inside the lanes and felled trees which were liable to throw sparks beyond the lines. Back fires were started at favorable points and the fire was fought back "blaze against blaze." By Tuesday night it was under control.

It was of interest to note the different types of men who responded to save Uncle Sam's timber from the flames—adventurers, cowboys, miners, railroaders, mine owners, clerks and a lone preacher. One chap on the fire line was a college man from Chicago, roughing it as a cowboy. An assistant cook was a baritone singer and pianist. Several Mexicans, carrying fine army blankets and silver spurs wrapped in their beds; had probably drifted up from the border—ex-Villa soldiers? One ad-

venturer was a veteran of the Boer War, a strapping six-foot, sunburnt American who seemed absolutely tireless. He fought the fire from Friday night to the following Wednesday night, sleeping only ten hours the whole time. He was a type of the American adventurer all over, from his easy swinging gait to the cool nonchalance he showed under the strongest excitement. The forest ranger, quick to recognize a kindred spirit, had made him foreman of the crew who were fighting the fire at the most dangerous point. One time the wind whipped the fire up into the crown of the trees. The Mexicans at this point of the fire line left their tools and ran in terror as the tongues of flame shot up through the rolling smoke. The forest ranger and the Boer War veteran dashed into the smoke to bring out the tools and fell over a Mexican lying on the ground, overcome with smoke. They dragged him to safety.

The country was exceedingly rough and broken, and, while patrolling the fire lines, the ranger's horse fell with him and he was painfully injured. However, in spite of his injuries, he stayed on the job until his swollen muscles would no longer carry him. It was worth the effort. One of the mournful sights to a person who loves the forests is to ride over a burned area—nothing but blackened, fire-killed pines.



THE FIRE STARTING

View of the fire on the Prescott National Forest, Arizona, soon after it was discovered by the Forest Service fire lookouts. A brisk wind caused the fire to spread rapidly.

"Still stands Thine ancient timbered aisles,
Once forest green, now smoking burn."

The Horsethief fire, however, had its cheering feature. While the area burned over was large, it was only a tithe of the acres of tall pines which were saved. Had the spreading flames been allowed to burn unchecked, the green country for miles around would have been a desolate wilderness.

5,000 MORE MEMBERS

We wish 5,000 more members this year.

We urge our members to nominate friends for membership.

War Consuming Britain's Forests

THE lumber needs of Great Britain, due to the unprecedented demands of the war, and with supplies from most other European countries cut off, are so great that many of England's and Scotland's fine old forests, many of her parks and the estates of private owners are now being denuded of trees. The cutting and the lumbering are being done by a Canadian Forestry Battalion, the 224th, and by Irish and Portuguese timbermen, while two more battalions, the 238th and the 246th, are now being recruited in Canada for service both in England and in France.

The 224th Forestry Battalion is doing most of its work in the north of Scotland, cutting Scottish pine. There is a company at work in the royal park at Windsor Castle, cutting trees there, and a third company at New Forest in Hampshire.

Eight sawmills have been sent over from Canada to England, six for the 224th Forestry Battalion and two for the forestry committee in England which has supervision over lumbering operations there during the war. They are mills typical of the Canadian lumbering industry and are generally known in Canada as portable mills. They are entirely new to the British Isles and their great efficiency is said to be causing much interest. They have each a capacity of 15,000 to 20,000 feet a day and include the edger, slash saw, saws for making railway ties, etc., in addition to their big 56-inch circular saw. They have 40-horsepower locomotive boilers.

The extent of the cutting is described by a London correspondent who says:

"Not even in the days of the Armada and the wooden walls of England was there such a tree felling as is now going on in Great Britain. In every wood the sound of the axe and the saw can be heard and lumber camps as picturesque as any on the Missouri are to be found as far apart as the Scotch fir woods and the Windsor and New forests, where the Canadian lumbermen are working. Behind the statement of Mr. Acland in the House of Commons that the Home Grown Timber Committee had been successful in securing supplies, there lies a story of one of the best efforts that has been made by any Government department to meet the present war emergency.

"The emergency work of the committee has included not only the importation of Canadian lumbermen, but the importation of Irishmen and even of Portuguese who are now employed in cutting pit props to supply the Welsh coal fields.

"By an order in Council under the Defence of the Realm Act, the committee has been empowered to commandeer all the timber resources of the country, but so far their action has been limited to negotiation with the landowners, who, Mr. Acland says, 'have met them most fairly.' This step was rendered necessary by the fact that the Government had no large supply under its own control. Britain was not alone in failing to anticipate the consumption of timber which war would entail. In

none of the belligerent countries, not even in Germany, had a proper estimate been made of the demand that would arise for ash wood for wagons, for fir for trench work, for woods for hutments and for the thousand other needs of the army.

"There remains, however, this difference, that Germany and the other countries had their supplies at hand in the best possible condition of storage—in their forests—while the British even now, when tonnage has become so important a factor in the war, are importing some six or seven million cubic feet of timber each week. If in these circumstances the German submarine warfare had been more successful,

there would have been necessary a wholesale destruction of British forests which would have laid England bare for a generation.

"Now much is being done to use Britain's own natural resources, and much more will probably be done during next winter, if the war lasts as long. Some definite plan must at once be laid down for afforestation after the war, and the three essential things the Government at that time must be certain about are, where to plant, what to plant and whether they have got the plants to carry out the scheme. Of these three the last comes first.

"The plants must be ready when the labor released after the war is available, and here a little war time discovery on the part of the committee is worth mention. They have discovered that Scotch fir makes better railway



224TH CANADIAN FORESTRY BATTALION

The hardy woodsmen of this contingent of Great Britain's army were recruited in the lumber camps of Canada, and the men are now at work in the forests of England. Two similar battalions are now being organized.

sleepers than imported pitch pine."

Of the Canadian contingent the *London Times* says:

"If you would know the lumberman of Canada and how he works, go to the edge of Windsor Great Park, where the cross-road from Virginia Water Station strikes the main road between Egham and Sunningdale. There, on the Clock Case Plantation, you will see over 150 men of the 224th Canadian Forestry Battalion converting trees into railway sleepers and boards at the rate of anything from 15,000 to 20,000 board feet a day.

"The plantation, which forms part of the lands owned by the Crown and administered by the Commissioners of Woods and Forests, included a considerable area covered with spruce, fir, Scots pine, and larch, with an undergrowth of chestnut. Not very long ago a party of experts looked at the trees with the dispassionate measuring eye of the undertaker, and gave it as their opinion that from this wood it was possible to get 3,000,000 board feet of timber. Today whole tracts of it have been swept clear by the axe, and the quaint square tower of the old royal lodge, which stands deep-set in the wood, and which, so the story goes, by its resemblance to the case of a grandfather's clock gave the plantation its curious name, is visible from the roadway for the first time, perhaps, in a hundred years. And still the Canadian woodsmen go on, eating their way through the wood with a thoroughness that knows no mercy.



CANADIAN SOLDIERS FELLING TREES IN WINDSOR FOREST

The English are much impressed with the vigor and the skill of this overseas battalion, composed, as it is, of experienced lumbermen from all sections of Canada.

"The lumber camp is all Canadian—men, machinery, and methods. The men, who are drawn from all parts of the Dominion, have the bronzed, healthy look and the easy confident swing which we have learned to look for in Canadians. The khaki under their blue overalls proclaims them soldiers; they draw military pay and they know the rudiments of military drill; but first and last they are woodsmen, with their craft at their finger-tips. Every man knows his task and does it with an enviable independence of orders or instructions; yet from the first stage to the last the work proceeds smoothly and harmoniously. Let us follow the process, under the guidance of the officer in charge and the sergeant who is 'foreman of the bush.'

"Facing the main road stands the mill—'home,' the men generally call it—flanked on the one side by piles of logs and on the other by stacks of sawn timber. Walk along the winding track of a light railway, not yet completed, which passes behind the mill, until you come to a clearing, where burning heaps of 'brush' lopped from the tops of the fallen trees are filling the air with the refreshing scent of the pine. Here and there through the blue smoke you catch a glimpse of a lumberman in a picturesque slouch hat. A little further and you are among a gang of 'fallers.' Watch how they fell a tree, 70 inches or more thick at the base.

"A man with an axe kneels at its foot and with a few dexterous strokes cuts a deep notch in the trunk a few inches from the ground. Two others with a cross-cut saw cut through the stem on the opposite side. In half a minute the tree begins to lean and there is a warning shout. A second or two later, with a loud cracking and rending sound, it topples and



By Courtesy of Country Life of England.

STACKING THE SQUARED TIMBER

With sawmills in the forests where the timber is cut, the Canadians are turning out many carloads of lumber a day, most of which is shipped to the army in France.

crashes to the ground. Without any apparent effort, the 'fallers' have controlled the direction of its fall almost to a foot.



By Courtesy of *Country Life of England*.

CANADIAN STYLE OF PELLING TREES

There has arisen, since England started cutting her forests, a good-natured controversy as to which style of tree cutting is most effective—the Canadian, Portuguese or Irish.

"Next, without any ado, half a dozen 'swampers' set to work with the axe, clearing the limbs and straightening up the tree. Simultaneously a 'fitter,' with a wooden rod, divides the stem in suitable lengths, marking the cutting points with a notch; while two other men, one carrying a paint pot, measure the tree, enter the size in a book, and mark the stump and the butt of the severed trunk with a blob of red paint to show that their work is done. Sawyers then cut the stem according to the 'fitter's' marking, and the sections are ready to go to the mill. They are dragged there by horses over deeply scored 'trails' and 'sloopways,' and take their turn to come under the saw.

"The mill itself is a stoutly built structure, made of timber cut and prepared on the spot, the saws and engines coming from Canada. It is practically a raised platform covered by an iron roof, but open at the sides. A log to be sawn is rolled into position on a 'carriage,' which moves backwards and forwards to carry it through a circular saw. Two men, standing on the carriage, control its movements and the position of the log by a number of levers. Opposite them stands the most important man of all, the 'sawyer,'

whose trained eye sees at a glance what can be made of this or that log. The hum of the engine and the screech of the saw would drown his voice, so he gives his decision by signs. As the carriage brings a log back through the saw with the bark removed, he will hold up one finger or two, and the 'setter' on the carriage, by movement of a lever, adjusts the log so that the next cut shall be one inch or two inches thick.

"It is all done without a pause. For hours the saw screeches and throws off a spray of sawdust as it slices up the logs that a short while before were splendid living trees, and all the while other saws, trimming the edges of the boards and cutting off the ends, join in the chorus. Is it surprising that the daughter of the keeper of the wood was reduced to tears when she stood by the mill?"

Of the uses of lumber in war, *Country Life of England* says:

"War has turned out to be a great consumer of lumber. Passing by for the moment the wooden huts and wooden carts for lodging and transport, the miscellaneous crowd of wooden boxes, cases and implements fashioned for equipment, how dependent on wood is the soldier when he takes the field! It did not take him long to learn that in a country like Flanders, with modern guns pointing at them, trenches must be deep to be of the slightest use, and that if they were deep would not stand wet weather unless propped with wood. Conjure up a vision of the wood being employed in the trenches, not of one army



By Courtesy of *Country Life of England*.

THE PORTUGUESE WAY OF CUTTING DOWN A TREE

The Portuguese contingent of timbermen in England was imported from Bragos, Maine. They are heavy, willing fellows and good workmen and have become prime favorites with the English.

only, but of many, and it will be understood that the timber swallowing power of the coalpit as compared with that of the trench is as the swallow of the minnow compared to the swallow of the salmon. And yet the trench

represents only a feature of the total, especially in these days when military science orders that front line trenches should only be lightly held. Behind are the much more elaborate dug-outs. In the original trench the danger experienced was that of rain bringing on a landslide. The occupant in more than one instance was buried up to the shoulders in earth, and shot by the enemy before he could be extricated. In the early dug-out many lives were lost by shrapnel and splinters. From these they are now fortified by a roof built of heavy beams laid side by side. Let it be realised what a consumption of timber this means. Yet, practically speaking, there is no choice as to material. Steel is possible, but is in too much demand for actual fighting stuff. Cement has been tried, but will not do.

"On the road behind the lines there is an immense employment of heavy timber, without which the present advance, for example, would



By Courtesy of Country Life of England.

AN IRISH AXEMAN AT WORK

Country Life of England says: "The Irish are skilled men and have done good work. They have a slight tendency to desire change, and every now and then a man or two 'slips it,' as their own foreman put it."



By Courtesy of Country Life of England.

ENGLISH WORKING WITH A CROSS-SAW

The English workman is more efficient with a cross-saw after a tree is felled than in felling the tree and most of them are used for this work.

passage over roads that in the fearfully wet weather would otherwise have been impassable to heavy military traffic. The Army is like a monster which has to be fed continuously on great shiploads of timber. The Home Grown Timber Committee is in this sense a great destructive agency, since it exists for the purpose of feeding this tremendous appetite as far as this can be done from home. Portugal, Spain and France have contributed a vast share. The demand is almost exclusively for soft wood, which is so much easier carried, manipulated, sawn, nailed and so on than hard wood."

THE bark of black oak, or "yellow oak," as it is often called on account of the color of the inner bark, is now used for dye-making.

not have been possible. When the great guns used by the Germans at Verdun and by us to demolish their trenches between the Ancre and the Aisne have to be got forward, the only way to do it is by temporary railway lines. Hence the demand for sleepers. And every sleeper signalises that a large tree has been felled. Any intelligent student of the daily war news will be able to imagine without difficulty what a prodigious quantity of timber is being used up for this purpose alone. Nor can there be much need to enlarge on the other military demands for wood. It has been used freely not only in bridge building across rivers, but to make a bridge or



A PORTUGUESE GANG FROM BRAGOS

Deserts Due to Deforestation

By MOYE WICKS

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THE history of civilization has been a record of increasing deserts. Trees have disappeared before the advance of man like the buffalo. It is axiomatic with scientists that no country was originally a desert. All deserts have been man-made. The tree growth in Eastern and Central Asia and Northern Africa, the birth-places of the human family, soon fell before teeming populations. Those countries were already in process of becoming deserts before systematic agriculture was known in Europe.

When Zenobia was overthrown by the Romans under Aurelian, Palmyra, her capital, was the metropolis of a mighty empire. Now the shifting sands of Sahara almost hide the ruins of that stupendous city of marble and gold.

As late as the rise of Mohammedanism, in the seventh century of the Christian Era, the country of Tripoli, on the north African coast, had a population of 6,000,000 souls. It was then clothed with vineyards, orchards and forests. It is now bare of vegetation, the streams dried up and the population reduced to 45,000 people. The heat is so intense that the little labor done there is postponed until after the setting of the sun.

All this is due to reckless ravages upon tree growth. The hatred of a Turk for a tree is proverbial. Wherever

the crescent of Mohammed achieved victory the Moslems destroyed the trees with nearly as much zeal as they have displayed in slaying those denying the inspiration of the "Camel Driver of Mecca."

Champollion, the famous Egyptologist, says of the Sahara desert of Northern Africa: "And so the astonishing fact dawns upon us that this desert was once a region of groves and fountains and the abode of happy millions. Does any crime against nature draw down a more dreadful curse than that of stripping Mother Earth of her sylvan covering? The hand of man has produced this desert, and, as I verily believe, every desert on the face of the earth."

In similar vein, Baron Alexander Von Humboldt says: "Man by his own recklessness brings upon himself a scarcity of wood and, resultingly, a lack of water." The famous Dr. Schleiman writes from Salonica: "As a fellow Unitarian, I feel sorry for the Turks, but as a respecter of God's physical laws, I must own that they deserve their fate. Men who for twenty generations have shown themselves tree-destroyers on principle, have no right to complain if the world rises against them."

The student of natural science adopts these words of the distinguished explorer of the ruins of Troy, albeit



NO TREES TO BE FOUND HERE

This, at one time, well-forested section of Algeria, one hundred miles south of Algiers: now a desert. Sudden rains fall and swell the mountain water-courses into temporary torrents, which almost as quickly subside. The herd of camels is being driven south after bringing up dates from the desert of Sahara.

with fear that, when weighed in the balance, our Caucasian race may prove, in this respect, equally remiss with the "turbaned and most malignant Turk."

Spain, Portugal, Southern Italy, Greece and many portions of both Americas, have suffered from the same reckless vandalism. Spain contains, in many of its provinces, only ten per cent of its former population, for even in the time of Vespasian it had, according to Pliny,

in succession. The climate of that entire region has become 30 degrees warmer than what it was before, its forests were destroyed. The climate of Southern and Central Europe is 20 degrees warmer than when in a condition of sylvan normality.

According to Xenophon, Greece, in his time, had winters of intense cold. He records in his "Memorabilia of Socrates" (for he was the Boswell of that ancient proto-



DENUDED MOUNTAINS IN ASIA MINOR

This view is of the village of Koplou, 130 kilometers southeast of Constantinople. The results of deforestation in the almost completely denuded mountains are seen. The areas of attempted reforestation are indicated by spots in which the shrubs are regularly spaced.

360 large cities. Greece now supports only 5 per cent of the population it had when it produced sculptors, poets, orators, philosophers, statesmen and soldiers, whom modern times have not surpassed. Indeed, all the coast that abuts upon the Mediterranean suffers more or less from the practices that consign the treeless country to aridity.

In ancient days, rain was so normally seasonable on all the Mediterranean shore lines that drought was considered a portent of the anger of the gods.

Northern Africa not only was self-supporting but was, in conjunction with Sicily and Sardinia, the granary of Rome; now Tunis, the site of the once great capital city of Carthage, is as nearly of furnace heat as the human family can endure.

De Baudin records the temperature in Eastern Algiers as 128 degrees in the shade for a great number of days

type of Dr. Samuel Johnson) that in the expedition against Corcyra, Socrates, to silence the complaints of his fellow-soldiers at their exposure, marched bare-footed through the deep snows.

Cyrus, the same author relates in his "Anabasis," used to pass seven months of every year at Babylon, in the valley of Euphrates, to enjoy the perpetual spring there prevailing; now the heat is so oppressive in that treeless land as to make the people wholly inefficient and to render life well-nigh unbearable.

Horace in his ode "Ad Thaliarchum" speaks of the hail and snow on Mount Soracte, upon whose sun-baked sides no snow or hail has fallen for many centuries.

Asia Minor, for these same reasons, has become a parched and dying country. Spain and Portugal have lost productiveness as to 80 per cent of their former agricultural fields. The people are suffering from a

mental and psychological dry-rot, superinduced by the physical dessication of their lands.

We of the United States are traveling the same road, but traveling it with more rapidity. Our population is increasing and our means of feeding it decreasing. In two hundred years we have slain more trees than Europe slew in twenty centuries. The deadly work of deforestation is manifested in dry creeks and diminished rivers, where once those arteries of agricultural and commercial life were running bank-full.

When the rain comes now, it comes in torrents which rush off to the sea, laden with fertilization washed from the surface of the water-sheds. Such sudden downpours frequently flood the surrounding plains, with disastrous results to property and even to life.

Germany and France, according to a distinguished authority, suffered more damage by the floods of the single year 1883, than by all the expense and losses caused by the Franco-Prussian war.

Fifty years ago, De Bonville, Prefect of the Lower Alps, addressed to the government a report in which he describes the appearance of the upper mountain valleys after the loss of their forests, from which report the following excerpt is taken:

"There is no doubt that the vegetable mold of the Alps swept off by the increase of that curse of the mountains, the torrents, is daily diminishing with frightful rapidity. All our Alps are wholly, or in large proportion, bared of wood. Their soil, scorched by the sun of Providence, cut up by the hoofs of the sheep, which, not finding on the surface the grass they require for their sustenance, scratch the ground in search of roots to satisfy their hunger, . . . is periodically washed away and carried off by melting snows and rain-storms."

In our own country the overflows of the Mississippi River alone have caused more loss of property than all the wars in which our government has ever been engaged, and these overflows directly result from ill-regulated torrential rains arising from abnormal conditions caused by deforestation of its enormous water-shed.

Many portions of Europe, occupied by industrious nations for more than a thousand years, are better supplied with forest trees than some of our own states. There are localities in North America which, a generation ago, were a part of the great American forest, yet now, since becoming denuded of tree growth, have fallen into that condition of chronic lack of rains which makes

good crops the exception and not the rule, and which is the precursor of an ultimately desert condition.

Even as the stripling, coming by inheritance into a large estate, loses sight of the value of his possessions in the ease of their acquisition, so we Americans have prodigally wasted the superabundant advantages afforded by the resources of the new world. Every intelligent man of mature years will recall instances, within his own observation, of diminution of rain-fall going hand in hand with diminution of tree growth in the



DESOLATION IN ALGERIA

Representative of the Smithsonian (Washington, D. C.), astronomical expedition of 1912 near Bassour, Algeria. This station is on a rolling plateau region about fifty miles south of Algiers. Heavy snowfalls occur in winter and occasional small rains in all months. Except for a few scrub oaks the region is now treeless and vegetation is completely dried up—once this region was well wooded and prosperous.

same locality—a steady decrease in regularity and amount of rain-fall being perceptible wherever the forests have been devastated by man.

Utah illustrates the same scientific truth, but conversely, for the Mormons, who found the country treeless, have nearly doubled their annual rainfall, and have largely increased the size of their lakes and streams by planting orchards and by reforestation. In much the same way Nebraska has been made productive within the last thirty years.

Near the close of the last century the great lake in the Valley of Aragua, in Venezuela, was found to be rapidly lessening in area as the clearing increased, so that it was about to become dry. A civil war breaking out at that time, with the virulence for which South America political affairs are noted, the forest was allowed to spring up again through neglect of agriculture, and, in a quarter of a century, the lake and its tributary streams resumed their original dimensions.

Dr. Rogers, of Mauritius, gives this testimony: "So late as 1865 this island was resorted to by invalids from

India and elsewhere as the Pearl of the Indian Ocean—it being one mass of verdure—but when the forests were cleared to make space for sugar cultivation, the rainfall diminished; the rivers dwindled to muddy streams; the water became stagnant in creeks, crevices and natural hollows; the equable temperature of the island entirely changed; drought was experienced and showers rarely came. The hills were subsequently planted with trees and the rivers and streams finally resumed their former dimensions.”

George P. Marsh, in *Man and Nature*, says: “A territory larger than all Europe, the abundance of which in bygone centuries sustained a population scarcely inferior to that of the present Christian world, has been entirely withdrawn from human use, or at best inhabited by tribes too few and poor to contribute anything to the moral and material interests of mankind. The destructive changes occasioned by the agency of man upon the flanks of the Alps, and Apennines, the Pyrenees and other mountain ranges of Central and Southern Europe, and the progress of physical deterioration, have become so rapid that in some localities, a single generation has witnessed the beginning and the end of the melancholy revolution.”

The distinguished Sir John Herschel, speaking of the destruction of forests, says: “This is no doubt the reason of the extreme aridity of Spain. In France much injury has been done in like manner by tree destruction. Rain has been much increased in Egypt by vigorous planting of trees.”

The country where Carthage once controlled her great republic, containing 300 cities, is now the scorched abode of indolent Tunisians. Gibbon declares “that 500 cities once flourished in what are now the dry depopulated plains of Asia Minor.”

Palestine, now but a memory and a shrine, was at one time the most productive section of the ancient world, crowded with cities and villages, and of such political prominence, at even the late day of her conquest by Rome, that the Senate decreed a special triumphal arch to be erected to the victorious Roman general in commemoration of the downfall of Jerusalem, and ordered medals struck with the exulting inscription “Judea Capta.” These medals have been found in the mud of the Tiber and in Roman excavations, and the triumphal arch to Titus still stands in the Appian Way—all bear-



RICH BOTTOMLANDS DESTROYED

Once this valley near Wu-tai-shan in Shan-si Province, China, was fertile, had rich farms and sustained a large population. The people stripped the mountains of their trees, failed to provide for reforestation and in time the mountains became what they are now, bare mounds of earth and rock. Rainfall and erosion did the rest. Rock and earth slides from the mountains swept into the valley, covered the rich soil, destroyed the farms and turned the region into a rocky desert.



ABANDONED FOU-PING, CHI-LI PROVINCE, CHINA

This once prosperous city has been abandoned because the once well-forested hills in the vicinity have been stripped bare of trees, the springs have dried up, and there is nothing by which to sustain the inhabitants of the city. This city was built and the plain cultivated in 1725 and since that time the hills have been cleared and the district ruined.

ing testimony of how important Palestine was deemed by the Mistress of the World before the tree-destroying Turk made it a sterile waste.

The island of Santa Cruz, off the coast of California, once supported an extensive Indian population; now that it has been stripped of its forests it has no water, and gives no return to the husbandman.

In Europe attention has been turned of recent years to this subject more than would be supposed by one who has not given such matters investigation. In every country in the Old World, save the British Islands, there are schools of forestry, and such schools are notably numerous in Germany.

In thickly-settled France, so many lives were lost and so much property destroyed by the torrential rains incident to forest destruction that a law was enacted, and is now in force, throughout that Republic, providing that, if a field become bare of trees, and is, in the opinion of the local authorities, better suited for arboriculture than agriculture, governmental aid will be given to the owner by furnishing him trees at a nominal price. If the owner fails to plant the trees, or, having planted them, fails to care for them, the local superintendent of tree culture may take possession and maintain the trees at the cost of the French Republic. Within five years the owner may, by paying to the government the principal and interest of the outlay, redeem his field; or, by deeding one-half to the government within that time, may redeem the other half, but if he does neither, the entire field becomes governmental domain at the expiration of that statutory period. These provisions of law may seem like "locking the stable after the horse is stolen,"

but sometimes, by locking the door even then, we may save the balance of the livestock.

It is certain that the arid lands we have in North America have been made so by the extermination of the trees through forest fires and, possibly, the destruction of trees for fuel and clearing for cultivation by the great pre-historic agricultural people who preceded the nomadic Indians. The springing up again of these destroyed forests may have been prevented by the resulting drought, or by the young trees being killed by the frequent prairie fires kindled by man or arising from spontaneous combustion; or by the young trees being eaten or trampled down, while yet small, by the buffalo and other herbivorous quadrupeds which abounded in earlier times. The Indians frequently made fires to kill the tree growth to make better grazing for buffalo and deer, and to thereby make their immediate localities more attractive resorts for wild game. The stockman frequently does the same now to improve the pasturage for his cattle and horses.

It is a legend of the Kiowas, at San Geronio, California, that many centuries ago the Indians prayed the Great Spirit for a ruler, and He sent them a king who was white, blue-eyed and bearded. The legend continues that this king governed them so successfully as to convert all the lands into a garden and that orchards and vineyards, watered by running streams, covered all of what is now the Colorado desert. According to the story, as told by Kiowa Indians, the people became so proud that they ceased to worship the Great Spirit and made an idol of their king, and to punish them their god dried up the stream, destroyed the orchards and vineyards and made the Colorado desert.

This tradition was related to the writer many years ago by Manuel Largo, the chief of the Kiowa tribe. It is interesting in two ways. It seems to point to a successful civilization under the rule of some fair-skinned stranger—perhaps some shipwrecked blonde and bearded Phœnician of remote antiquity, and it seems also to substantiate the theory, here advanced, that originally there were no deserts. All students of myths and folklore admit that every deep-rooted racial legend has some origin, however slight, in actual fact, and it may well be that this tradition is a record, naturally intermixed with blunder, of a time when bounteous Nature smiled on industrious man, and

What is a tree and what is a leaf and what are their functions?

In reply, it may be said that a tree is a great botanical structure intended as a conductor of moisture from earth to air; an attracter of moisture from air to earth; a moderator of heat in summer and of cold in winter; and, by reason of its shade, its obstruction to winds, its root system and its sap, an economizing storage and conservator of the actual rainfall.

The leaves are the lungs of the tree. In the economy of arboreal nature they are the equalizers and moderators of temperature and moisture. When the air is moist they



DEFORESTATION—THEN DEVASTATION

This view shows two hundred square miles of the once well-wooded mountains in the vicinity of Fou-ping, China. This district a century ago paid rich revenue from its forest products. Today it is practically a desert.

when all the great Colorado desert actually afforded support to a soil-tilling population. In fact, a marvelously productive section of country has been rescued from the Colorado desert of recent years and now is known in the Imperial Valley of Southern California.

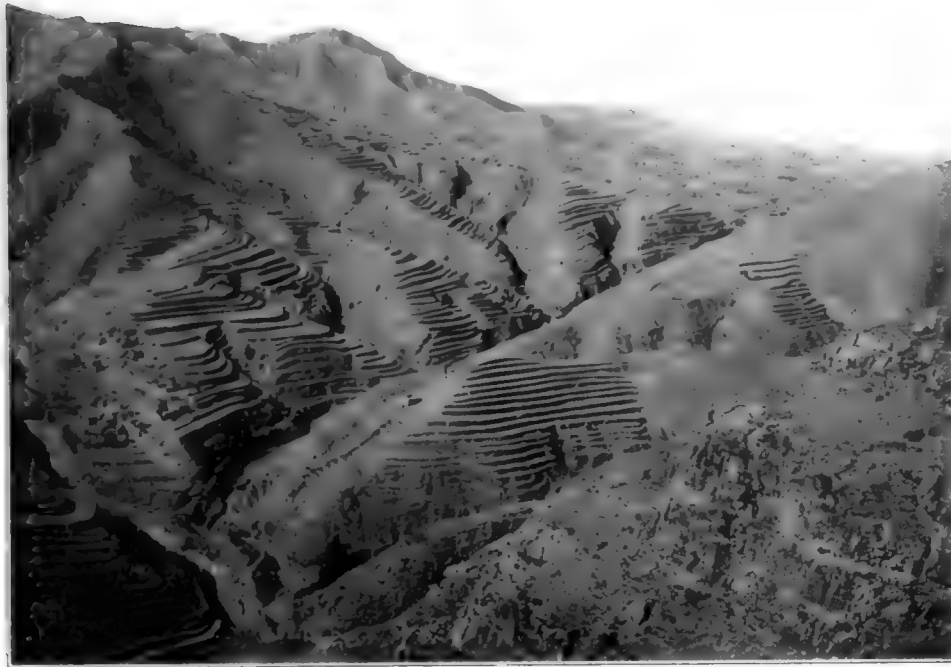
In the incalculable antiquity of man's pre-Adamite occupancy of this planet, the comedy and tragedy of life may have been played by teeming millions in arid America thousands of years before our half-naked ancestors hurled their rude spears at Cæsar's cohorts disembarking upon the shores of England. The earth is the grave of the past as well as the tomb of the future.

Trees are inducers of rain, and, in a special degree are conservators and gradual distributors of the moisture that falls. As things to which we are most accustomed are sometimes the least known to us in an accurate way, it may not be amiss to propound and answer an apparently simple question:

absorb the dampness and thriftily store it away in capacious reservoirs of millions of tubes in the trunks and limbs of the trees; and, when parched Nature looks upward and prays for water, like Dives did to Abraham and Lazarus, these same little "miracles of design" draw on the supply of water in the tree that they have stored away and that the rootlets have absorbed from the earth and send the precious liquid forth into the air, an unseen exhalation to be condensed by the atmosphere and to fall in benedictory showers or refreshing dew.

This same water, but for the tree and its foliage, would be carried away by vagrant winds, or, if it fell, would fall in sudden gusty showers and be lost to use.

It is known to botanists that each square inch of leaf-structure lifts and throws out into the air in dry weather 6/1000 of an ounce of water every twenty-four hours. A large forest tree has foliage equal to above 5 acres of superficial area, or 6,272,600 square inches. This



TRYING TO SAVE WHAT IS LEFT OF THE SOIL

Having no tree growth, no undergrowth, and no natural growth of any kind, these hills in China have to be subjected to the kind of artificial terracing shown in this photograph in the effort to save what little of the soil there is left.

multiplied by 6, 1000, the amount radiated out by every square inch, gives us a number of ounces equaling 294 gallons, or more than eight barrels of moisture thrown out into the dry air each twenty-four hours by each large forest tree. Other trees that need more water will, if growing nearby, absorb it from these generous neighbors, as for example, the magnolia will flourish at Los Angeles, California, if near other trees, but will die if it be planted alone.

In another and preëminently important way, the leaf is constantly at work for man. Its serrated edges are tiny tentacles to catch the electricity and send it down to work vivifying effects upon the earth. The soil is energized by this constant electrical stimulation. It is proper to use the adjective "constant" for the process goes on all the time. Electricity is more constantly tingling through the fibres of a growing tree than it is through a telegraph wire. It is a mistake to suppose that the electrical current never touches the tree save when it is said to be "struck by lightning." This bursting open of the tree by lightning is only when the attraction of the tree brings to it, in highly charged electrical conditions of atmosphere, more electricity than the trunk of the tree can.

at one time, normally transmit from the leaves to the earth.

It is not merely because they attract precipitation of rain that trees are valuable to climate and to productiveness. In the forest soil that they cover and make solid by their root systems and enrich and mulch with their decaying leaves, the rain finds storage for much more than can be absorbed by tree roots.

This stored water, by slow percolation, trickles (without washing or injury to the soil) from its spongy reservoirs among the roots, leaves, moist and cool depressions in the forest glades, and feeds the springs and water courses when nature is athirst. In the same way do trees preserve the snow from sudden melting and hold it in reserve for human needs.

On the other hand, the treeless country receives its diminished rain torrentially, accompanied by violent squalls of wind—the decomposed vegetable matter and the surface soil, that has been disintegrated into mellowness by sun and air, are washed from the surface of the hills and sloping plains and carried away into the sandy river beds (along with the torrents of escaping water) to be lost in the sea or to enrich some delta country far down the stream. In such countries it frequently happens that great raging floods pour down river beds—ordinarily dry-rivers, as one might say, invisible in the dry season and invincible in the wet season.



ARTIFICIAL TERRACING IN CHINA

Showing the efforts of the Chinese to save what is left of the soil after the forests are gone.

The water, so falling and so escaping, is a robber and not a friend. The merest surface is made wet by it and such moisture as it does leave is almost immediately evaporated by the winds that in treeless countries usually follow the atmospheric disturbances incident to rain. The torrential flow, thus carrying off the vital element for which all nature is suffering, seems to the thoughtful mind as the life-blood flowing from a severed human artery must seem to a surgeon.

The authorities on such subjects state that one acre of beech trees will absorb and subsequently throw out by slow degrees, as the dryness of the air may call for it, as much moisture as 200 acres of grain.

Such exhaled humidity not only mitigates the heat of summer, but modifies the cold of winter, this latter being on the principle that prompts the florist to place barrels of water in his conservatory to assist in protecting his flowers from freezing in seasons of cold.

In Sweden, there is a saying that the forest is the peasant's fire. In our own country all must have observed, after traveling over a plain in winter, that if one enters a forest the temperature is much more moderate, apart from the protection from the winds which the forest affords as a mechanical barrier to their violence. This greater warmth engendered by tree planting spurs the adjoining vegetable growth, while the maturity of fruits and grain is not so much checked by cold at night and at other times.

Besides this actual mitigation of the temperature, trees, by checking the force of the winds in this way, also conserve the water in the soil by minimizing evaporation. All know how much more quickly an article will dry in even cold wind than it will hanging quietly in the warmest sunlight. Wet roads will dry much more speedily from wind than from sun action.

After the rain has fallen, water stands visibly around the grass roots in the pasture long after the bare road is free from moisture.

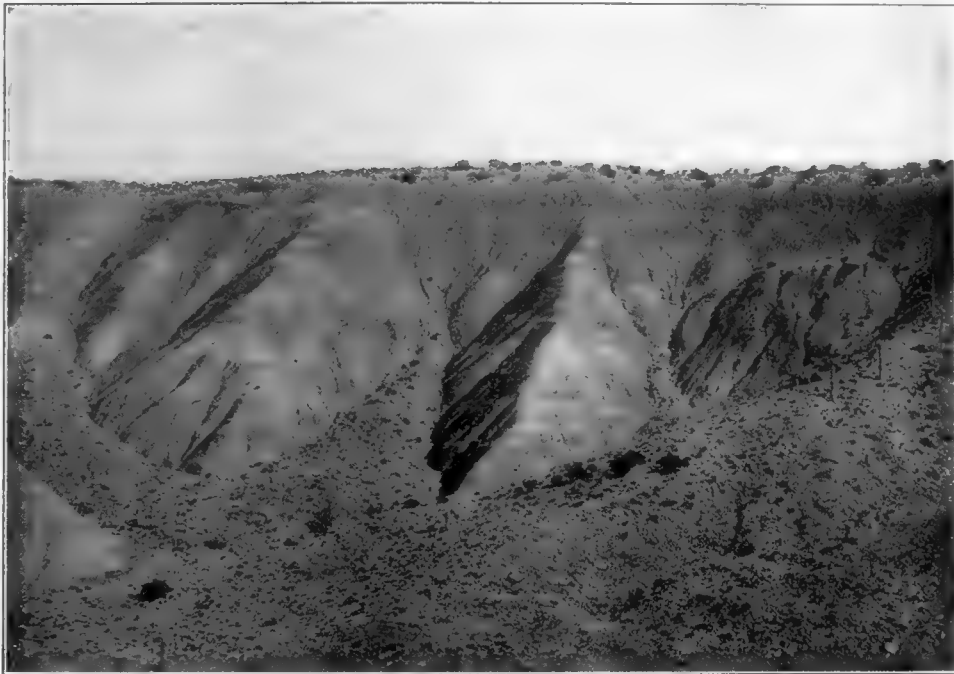
The air at rest is soon saturated with moisture and takes up no more until that with which it is laden is absorbed, but the unchecked wind, careering over the

treeless plain, greedily gathers all moisture and carries it away to precipitate it in sudden torrential showers, on, perhaps, the hot sides of a bleak mountain range hundreds of miles away.

The Colorado and Mohave deserts are not normally such—they are vast plains which would be fertile if they had not been robbed of their normal trees and thereby lost power of spontaneous productiveness.

Forests exhale oxygen, the absolute essential for

human well-being, and absorb and neutralize the noxious effects of carbonic and other injurious gases. The fever prevalent in the Roman Campaigna was so severe that the approach through it to Rome was, until recent years, an object of terror to Italians and foreigners alike. The monasteries there were abandoned and even to cross it was deemed suicidal; but now hun-



THIS IS IN OUR OWN COUNTRY

"Hog backs" in Salt Creek foothills in the neighborhood of the Roosevelt Reclaim Project, Gila County, Arizona, showing the results of deforestation.

dreds of thousands of eucalyptus trees having been planted there and having grown up, it is densely populated by farmers and vineyardists.

One of the secondary, but important, results of the present suicidal European war will be the wholesale destruction of the tree growth in the belligerent countries and the attendant train of ill which follows deforestation.

Some fifty years ago, Commodore Matthew Fontaine Maury (well known as the Christopher Columbus of the Gulf Stream) found the national observatory at Washington unwholesome, those living there suffering continually from fever and ague. To remedy this condition he planted large fields of sunflowers, and, though the Potomac malaria made the fever and ague extensively prevalent in the city generally, none of those living at the observatory, or in the vicinity of the sunflowers, were so attacked.

Dear Mother Nature responds generously to the efforts of her children to repair the mistakes of the past.

It may be remarked, parenthetically, that trees are the homes of birds, and, to say nothing of the æsthetic charm of their beauty and song, birds free the fields from insects and from bugs to such an extent that they deserve to rank high in the list of the farmer's friends. It is probable that if Texas had normal tree growth clothing prairies and

valleys, the birds would be numerous enough to have prevented the boll weevil and all other insect pests.

It is likely that the electrical functions of trees constitute their source of power to directly cause rainfall, but whatever the explanation, there can be no doubt of the potency of forests to attract precipitation. To name one of many illustrations of this, the annual rainfall of Egypt has been doubled by the Khedive's extensive planting of date palms, olive orchards and eucalyptus groves.

Aside from the general benefits to be derived from tree culture, there should be a special planting of willows, osiers and other flexible woods of the water-loving varieties, along the sides of the irrigating ditches. These will make stronger the ditch embankments against breaks and by their shade save water from evaporation. In addition to this consideration, it is worthy of mention that such growths can be utilized in various industries. Indeed, many manufacturing possibilities are denied treeless countries, to say nothing of the advantage forests afford for purposes of fuel.

Skilled industry can find work and riches in utilizing the materials afforded by varied wood crops—not merely acquiring, but creating wealth, for he who adds to the value of the products of the soil enlarges the wealth of his country in the truest sense.

The American mind is quick to receive and tenacious to retain a suggestion so fraught with interest. In this new land we do not fear innovation, but readily throw off the handicap of inexperience and inadvertence. Action should be taken to bring to public notice the truth about the important part trees play in all their bearings upon climate, floods, cyclones, droughts, blizzards, commerce, manufactures, agriculture and health. Laws should be passed in the various states giving at public expense to each reputable person such young trees as he will obligate himself to plant and maintain, and lands so planted in forestry form should be exempted from taxation for a liberal period of years.

State boards of forestry should be created to study the protection and encouragement of tree growth. All school children of suitable age should be required to plant trees on Arbor Day, and instruction as to the public school curriculum. All country roads and highways should be planted with rows of trees cared for by road overseers at public expense. Congress should set apart as permanent governmental reservations those large tracts of timbered mountain lands which we so urgently need in the interest of our streams and springs, and which otherwise will sooner or later be despoiled by the ruthless axemen, or by careless hunters or reckless stockmen. Every one should encourage the planting and protection of trees whenever and wherever possible.

An old writer asserts "the skin of the animal is not more necessary to its well-being than is the tree covering of the earth essential to the proper condition of the soil." In our own day Dr. Oliver Wendell Holmes declares, "When we plant a tree we are doing what we can to make our planet a more wholesome and happier dwelling place for those who come after us as well as for ourselves."

"Jock," said the dying Laird of Dumbiedykes to his son, in one of Sir Walter Scott's charming novels, "Jock, when ye hae naething else to do, ye maun e'en be sticking in a tree; it will be growing while ye are sleeping."

CHICAGO'S MUNICIPAL FOREST

The city of Chicago, or rather Cook County, which is practically the same territory, has begun to look forward to the day when it will have a municipal forest. An appropriation of about \$1,000,000 has been provided for the gradual establishment of such a forest. There has been a commission named to take up this problem, after thorough investigation. The details are far from worked out, but the theory of the municipal forest is what is of greater importance to the future of the conservation movement than the mere local details. The fact that Cook County is preparing to establish such a forest, something on the lines of the German forests, is a hint that the nation is coming to its senses on the problem of the future of the trees. The Cook County forest is probably to be called the county forest preserve.

But it is not only the big cities that are considering this problem. The city of Janesville, Wisconsin, a town of under 30,000, has decided to plant beechnut trees in the neighborhood of the city, and while at first the plan is only to beautify the highways radiating from the city into a thickly populated, immensely rich farming country, the plan has the future thought of solid forests of beech, duplicating the Danish forests. The county highway commission is back of the movement, Commissioner George S. Parker having received a consignment of beechnuts at considerable expense, from the royal Danish forest, and has opened a contest in tree growing for the boys of the county.



A SHAKESPEARE OAK

On the grounds of the Panama-California International Exposition in San Diego, California, on Shakespeare Day, the anniversary was celebrated by a pageant and by the planting of a live oak tree in memory of the great literary light. Little Miss Mary Church, who was in Stratford-on-Avon when the present European war commenced, had the honor of turning the turf for the tree planting.

The Bird Department

BY A. A. ALLEN, PH.D.

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FEDERAL PROTECTION OF BIRDS

A GREAT many years have now passed since the people of the United States first came to the realization that birds and game cannot stand unlimited slaughter and that they are worthy of protection by law. It was as early as 1791 that an act was passed in the New York Legislature giving some protection to the heath hen, the partridge, the quail and the woodcock. This was a step in the right direction, but it did not come soon enough to save the heath hen, for to-day this splendid bird is extinct except for a small colony carefully guarded on the island of Martha's Vineyard. The partridge, quail and woodcock have survived, but in greatly reduced numbers.

Nearly thirty years elapsed after the passage of this

tive of the inaccuracies and incompleteness retained in so many state laws even to-day. It was entitled, "An act to Prevent the Destruction of Small and Harmless Birds."

"1. Be it enacted by the Senate and General Assembly of the State of New Jersey, That it shall not be lawful in this State for any person to shoot, or in any other



WATERFOWL RESPOND VERY QUICKLY TO PROTECTION
Some wild bluebills that have been tamed by feeding at Ithaca, New York.

initial statute before anything further was done for bird or game conservation. Massachusetts next, in 1818, passed a law giving protection during the breeding season to certain game and insectivorous birds. This was the first time that such birds as the lark and the robin were recognized as having any economic value, but it was not until after the middle of the century that the cause was espoused by many states. Between 1850 and 1864 laws were passed in twelve states giving more or less protection to insectivorous birds as well as to game.

It will be of interest to quote the first of these, enacted by the State of New Jersey in 1850, because it is indica-



Photograph by Francis Harper.

THE RESULT OF STOPPING SPRING SHOOTING

A small part of a flock of black ducks flying over Long Island. Since they are not shot at, many stop to nest instead of going further north, and as a result their numbers increase rapidly.

manner to kill or destroy, except upon his own premises, any of the following description of birds: The night or mosquito hawk, chimney swallow, barn swallow, martin or swift, whippowil, cuckoo, kingbird or bee martin, woodpecker, claipe or high hole, catbird, wren, bluebird, meadow lark, brown thrasher, dove, firebird or summer redbird, hanging bird, ground robin or chewink, bobolink or ricebird, robin, snow or chipping bird, sparrow, Carolina lit, warbler, bat, blackbird, blue jay, and the small owl."

Since this period, when the Nation was first awakening to the need of legislation in behalf of game, great progress has been made, so that to-day every state has its code of game laws, although in some, where there is no warden system, they are but slightly respected and might almost as well be void. Many states, however, have model laws, uniform with those of adjacent states, leaving little to be desired from the standpoint of conservation. These laws define what shall be known as game birds and limit the season during which they may be killed, and all other birds, except a few that are known

to be injurious, they protect at all seasons of the year. Certain game birds, too, that are becoming very scarce are given absolute protection for a term of years and, furthermore, all traffic in feathers is stopped. In backward states, however, many birds known to be insectivorous are still classed as game, and open seasons on all game are designated regardless of the laws of neighboring states.

Spring shooting, for example, is acknowledged by



CANVAS-BACKS ARE COMING BACK

Since the stopping of spring shooting these ducks, beloved by epicures, are now reappearing on the Chesapeake and are increasing everywhere. There are a few bluebills among the canvas-backs in the photograph.

every thinking person to have been the chief factor in the very rapid decrease of waterfowl and shorebirds. Ducks mate early in the year, during February or early March at the latest, and when one of a pair is killed the other does not remate and no brood is forthcoming the following season. At best but two birds are secured in the spring instead of five or ten in the fall. To say the least, it is very poor economy and when added to it, the birds are disturbed on their nesting grounds during April, and perhaps do not breed at all, no thinking person should indulge in spring shooting.

With the abolishing of spring shooting in most states, there immediately occurred a great increase in all species of ducks; likewise shorebirds and some, notably the wood duck, woodcock, curlews and upland plover, were actually saved from extermination. Ponds that had not seen ducks for years again teemed with them, and hunting grounds that had been abandoned again gave good sport. In spite of this manifest improvement, however, we find, as late as 1915, some state laws still permitting the shooting of waterfowl until the middle of April, and when a revision of the Federal Statutes was called for, these states were insistent upon this privilege. One of the greatest difficulties that conservation workers have met in trying to establish model game laws has been the jealousy aroused by the laws permitting spring shooting in neighboring states. As long as any state permits spring shooting, the adjacent states will not be satisfied without it, because of the fact that waterfowl are migratory and the very birds that they are protecting on Monday may be shot on Tuesday if they fly across the border.

If all game and insectivorous birds were permanent residents, like the grouse and the quail, state laws would be sufficient, because no one would suffer except the makers of the laws, and if the people of a state wished to exterminate their song and game birds, they would be despoiling only themselves. But when we know that the majority of birds are migratory and can be said to belong to no state in particular, an entirely different problem presents itself. It becomes necessary for the Federal Government to step in.

To be more concrete, the people of North Dakota might claim that the mallard ducks belong to them because they breed about their lakes and consume the wild rice of their marshes. The people of Louisiana, however, with equal justice could claim the same birds, be-



THE BLACK-BELLIED PLOVER

These birds were threatened with extermination but are now increasing. A flock of a dozen on a bar at the north end of Cayuga Lake, New York. A few years ago it was exceptional to see more than two or three together.

cause from October until February they are consuming the duck potatoes of their lagoons. The citizens of the intervening states have some claim, likewise, because for a month or two in the fall and spring, while the mallards are passing between their breeding and wintering grounds, they stop in their ponds and feed upon their property. Now if the people of North Dakota should see fit to reap the harvest of their ducks in summer and thereby exterminate them, they would at the same time be exterminating the ducks of Louisiana, Arkansas, Missouri, Kansas and Nebraska.

In a similar way, the people from New Jersey to South Carolina can declare the "ricebirds" feeding about their marshes to be injurious and slaughter them by thousands. But for every "ricebird" that is killed the people of New York and New England lose one bobolink from their clover fields.

Realizing this, conservationists have gradually come to the conclusion that the game of a country belongs to the people as a whole rather than to the individual states, as was formerly believed, at least in so far as migratory species are concerned, and for the last twelve years they have been trying to bring this realization to the country at large. Ever since 1904 bills have been brought into

Congress aiming at Federal control of migratory birds, but it was not until 1913 that any one of them bore fruit. The first bills that were brought up failed because they had little support, but during the nine years that ensued, the public became aroused to the importance of bird life and the necessity for conserving the game resources. There was little doubt as to how Congress should act, but great opposition was brought forward by agents for milliners, market hunters, and the congressmen of backward states that were still enjoying spring shooting. Thus, after a long struggle, the Weeks-McLean Bill, as it is known, passed both houses and was signed by the President March 4, 1913.

According to its provisions "All wild geese, wild swans, brant, wild ducks, snipe, plover, woodcock, rail, wild pigeons and all other migratory game and insectivorous birds which in their migrations pass through or do not remain permanently the entire year within the borders of any state or territory, shall hereafter be deemed to be within the custody and protection of the Government of the United States, and shall not be destroyed or taken contrary to regulations hereinafter provided therefor."

The Department of Agriculture was authorized to draw up the regulations and submit them to the people for three months' consideration before final adoption. The task naturally devolved upon the Division of the Biological Survey whose corps of scientists have before them all the known facts concerning the migrations of birds, their lines of flight, their breeding habits, reproductive capacity and other necessary data. Could they be left free to formulate the regulations in accordance with their scientific investigations and conclusions, a very nearly perfect law would result. Their power is limited, however, and committees are human and listen to the demands of outraged congressmen whose constituents have had some of their "vested rights" removed and minor faults have crept into the regulations, such for example, as permitting in some states the shooting of bobolinks. But the regulations, as a whole, are so far superior to the majority of individual state laws that all true conservationists rejoice in their enactment.

By this McLean Law, the country is divided into two zones: the breeding zone and the wintering zone, and an open season is established for each, making such exceptions in different states as have been found necessary by variations in flight lines, times of migration, etc., effort being made to give each district an equal amount of shooting during the period when the birds can best stand it. Insectivorous birds are protected throughout the year, the smaller species of shorebirds are removed from the game list and certain species that are nearing extinction are given absolute protection for a term of years. No provision is made, however, for federal protection of such birds as the gulls and terns, grebes, herons and egrets which are so much in need of it, or for the little song sparrows, buntings, goldfinches, and horned larks whose food is largely the seeds of weeds rather than insects. There is still something to be done.

The McLean Law went into effect in October, 1914,

continuing in force through 1915 and, with slight revision, is being enforced in 1916. Effort has been made, however, to destroy the effect of the law by cutting out any appropriation to enforce it, but the friends of the Bill have managed to secure \$50,000 each year, a rather meager amount when one stops to consider the vast area of the United States and Alaska, for it allows of but one paid inspector for several states.

But the grave danger which presents itself is not so much the lack of appropriation, severe as that is, as in the fact that the constitutionality of the law itself has been questioned. One of the earliest cases that came up was that before a District Judge, in Arkansas, of a man who had killed some birds in violation of the McLean Law. In handing down his decision, Judge Trieber declared that there was no provision in the Constitution of the United States upon which the McLean Law could be based and it was, therefore, unconstitutional and could not be enforced. The case was taken to the Supreme Court where it now rests and from which a decision is expected some time this fall. In the meantime, the law has been enforced elsewhere and declared constitutional by other District Judges, and, strengthening it still further, a treaty with Canada along the same lines has been ratified by both Houses, signed by the President and awaits only the signature of King George. When the treaty goes into force and the McLean Law is either declared constitutional or an amendment made to the Constitution by which it may stand, there will remain only the matter of sufficient appropriation in order to put the United States in lead of the world in matters of bird and game conservation and guarantee to future generations the blessings which our forefathers enjoyed and the resources which have heretofore been so ravished.

In reviewing the history of what is perhaps the greatest stride that conservation has ever taken, one cannot but admire the altruistic labors of those who have devoted their time, their energy and their funds to the great undertaking. The National Association of Audubon Societies, The American Game Protective and Propagation Association, The Campfire Club of America, The New York Zoological Society, The Boone and Crockett Club, The National Federation of Women's Clubs, The Long Island Sportsmen's Association, and numerous other organizations and thousands of individuals all over the country, have worked untiringly, not only upon the Bill but upon educating the country at large so that it would react through Congress and bring about the result that has been so happily achieved. The eyes of the nation now turn toward the Supreme Court awaiting the decision that will announce whether the victory has been won or whether it will be necessary to postpone the enforcement of the law until a constitutional amendment can be made. But in the larger sense the victory has been won, regardless of the decision, because the country is awake. It knows the value of birds and the necessity for conservation. Laws mean nothing until they are obeyed, and an enlightened public sentiment is worth more than all the officers of the law.

The Crows and Jays

(Family *Corvidæ*)

SOMETIMES given first rank among birds because of their intelligence, the crows and jays, together with the ravens, magpies, and the European jackdaws, rooks and choughs, constitute a family of birds familiar to everyone. There are about two hundred species found all over the world, except New Zealand, twenty-one of which occur in North America. All of them make interesting but mischievous pets and many

ral dispersal of nut, oak and fruit trees and, like the crows, are undoubtedly responsible for the wide distribution and constant recurrence of poison ivy. The blue jay is the commonest species throughout eastern North America, the Canada jay or "camp robber" throughout the North Country, the Steller's jay throughout the West and the California jay in the Pacific Coast region. They are noisy birds, travelling in small companies except during the nesting season and delighting in mobbing a waiting hawk or a sleepy owl. At times they are good mimics and frequently bring consternation into the ranks of smaller birds by suddenly bursting in on them with the call of a dangerous hawk. Jays nest early in the spring,



CROWS IN WINTER AT A WATER-HOLE

After the nesting season, crows gather in immense flocks, and frequently tens of thousands are to be seen on a single roost. They are ever alert and difficult of approach.

can be taught to articulate a few words, but in their natural state they are hated by agriculturists and feared by other birds.

All members of the family have stout, heavy bills with thick tufts of bristles at the base concealing the nostrils, strong legs and toes, adapted for walking and perching, and strong rounded wings. Our American crows and ravens are uniformly black with metallic reflections, but the jays and magpies are brilliantly colored, blues, greens, blacks and whites predominating. Crows and ravens are further characterized by short square tails while the jays and magpies have long graduated tails.

All species are omnivorous feeders, taking nuts, fruit, and grain, together with insects, crayfish, fish and the eggs and young of other birds. Whatever is most easily secured always suits the taste of the crows and jays, and for this reason they are often of considerable value during insect outbreaks, because the insects are then most easily secured and are fed upon to the exclusion of everything else. On the other hand, where eggs or grain are more easily secured than insects, they may do considerable damage.

The jays are mostly woodland birds and the damage which they do is largely confined to the eggs and young of smaller birds. They are important factors in the natu-



USELESS? NO, WORTH SAVING?

The common crow of the United States is a mischievous bird, but wary enough to save his life even in thickly settled parts. He does considerable damage and much good and, on the whole, is not deserving of extermination.

building rather bulky nests of sticks lined with rootlets and laying grayish or greenish spotted eggs.

Crows are much more destructive than the jays because they combine with the thieving, egg-destroying habits of the jays, greater size and bolder habits. Thus they often come into the poultry-yard like hawks after young chickens and regularly feed about corn and grain fields. The damage that they do in the grain fields, however, is largely paid for by the numbers of harmful insects which they destroy. Many times it has been shown when they have been thought to be pulling the young corn, that they have been merely after the wire worms working about the roots. In the meadows they destroy large numbers of white grubs and grasshoppers, and fields near woods frequented by them have been cleared of army worms, while adjacent fields have been

entirely denuded by the worms. On the whole, however, crows are scarcely deserving of protection, yet certainly bounties should not be offered for them, nor should any attempt be made to exterminate them. On the other hand, they are such wary birds that they are well able to care for themselves and in no danger of extinction even in the most settled country. Because of their wariness they are usually easily frightened from corn fields by the ordi-



Photograph by Francis Harper.

A BLUE-JAY ON ITS NEST

Jays are noisy birds of quarrelsome dispositions and thieving habits, often robbing the nests of smaller birds.

nary scarecrow or strings stretched across the fields, provided these are moved about every few days so that the birds will not become accustomed to them. In extreme cases a gun fired occasionally in the general direction of the crows will suffice to keep them afraid of the scarecrows.

The fish crow, which is a smaller species found along the Atlantic Coast region, is even more destructive to small birds than its larger relative. It is less wary, often flying through city streets or walking about park lawns and its high nasal *cah-cah* sounds like the voice of a young common crow before it has left the nest. The raven which, with but little variation in size, is found throughout the Northern Hemisphere, is more a bird of the forests and wilder places and with the clearing of the forests in eastern North America has been entirely replaced by the crow.

THE Lincoln Highway between Salt Lake City and San Francisco, California, will be marked with redwood posts. There will be one post to each mile, the distance between these two points being 1,000 miles. These posts will carry the usual sign indicating that it is the Lincoln Highway. They will be set rough and will require no painting to protect them from the weather. The Lincoln Highway Commissioners had under consideration the use of boiler tubes and redwood was selected in preference.

THE WHITE-THROATED SPARROW

PAULINA BRANDRETH

NOT Orpheus fluting in his greenwood cell,
Nor shy Narcissus answering the call
Of lone, lost Echo in her mountain thrall,
Can such a tale of tender sadness tell
As thou, O sylvan whistler, who dost dwell
Midst forest deeps where balsam shadows fall.

Ere yet the sun ascends o'er swamp and glade,
Thy solitary notes, full-rounded, clear,
Float skyward from the secret haunts of deer.
In thee the Wilderness her heart hath laid,
To thee the pathos of her soul hath strayed
Like beauty cloistered in a human tear.

AN APPALACHIAN PURCHASE

THE National Forest Reservation Commission has approved the purchase by the Government of 59 tracts of land with a total of 66,880 acres in the Appalachian and White Mountains. Of this, 36,000 acres is in the so-called "Kilkenny Purchase Area," in New Hampshire. It is the policy of the Commission to build up Government holdings, as nearly solid as may be, through buying only in certain specified places, which are designated purchase areas.

The Kilkenny Purchase Area adjoins the so-called "White Mountain Purchase Area" on the north, and is on the water-shed of the Connecticut River. The land now approved for purchase is the first to be acquired in the Kilkenny Area. About 17,000 acres of land on the White Mountain Area was approved. This land lies for the most part on the west slope of the Carter Range and practically completes the Government purchases in the northern portion of the White Mountain region. With this land a total of 698,086 acres in the White Mountains has been acquired.

Smaller tracts were purchased in the southern Appalachian Mountains, the largest total of any area being that of 7,678 acres in Transylvania County, North Carolina, on the Pisgah Forest. Other tracts in Avery, Caldwell, Macon, and McDowell Counties, North Carolina, on the Boone, Nantahala, and Mount Mitchell Areas, aggregate 1,870 acres. Approximately 2,000 acres of the approved lands are on the Potomac, Shenandoah, and Natural Bridge Areas in Virginia; 956 acres are in Rabun and Union Counties, Georgia, and the remaining 586 acres are in Monroe and Sullivan Counties, Tennessee.

The \$3,000,000 recently reappropriated by Congress will be used mostly to round out the lands already acquired, so that they may be easily and economically administered. In making future purchases it is stated that the policy will be to select those tracts which block in with lands already purchased and which are offered at the most reasonable prices.

Forestry for Boys and Girls

by Bristow Adams

Is Jack Frost the Real Artist?

"Jacky Frost, Jacky Frost,
Came in the night;
Left the meadows that he crossed
All gleaming white;
Painted with his silver brush
Every window-pane;
Kissed the leaves and made them blush,—
Blush, blush again!"



SO SANG "Toto," the youngest boy, keeping himself cheerful during an enforced stay in bed with a bad foot. He will climb and jump with no heed to the limit of his strength or skill, until he bumps into that limit pretty hard, as in the present case. He was making a brave attempt to have a good time in spite of the hurt and the bandages, so his mother and the rest of us were seeking ways to help him keep his mind off his troubles.

"About that song—" said I, "it's a nice song, and I like to hear you sing it. But does Jack Frost really do all that?"

"'Course he does," he maintained stoutly; and the rest of the children joined their evidence to his. "Haven't you seen it? Don't the leaves turn red when he comes?"

"Yes; but let's look into that. Do you remember the gum tree that had the flaming red branch in August? Jack Frost hadn't been here then."

"What does turn the leaves red and yellow?" he asked.

"They turn themselves, and they'll turn at the right time, frost or not."

From that, we talked over the whole subject, and this is what we got out of it:

BRIGHT-colored autumn leaves seem to depend on the place and on the kind of tree. Two places in the world the autumn leaves have more color than anywhere else; these are in the northeast parts, generally speaking, of the two great land divisions of the Old World and the New, or in Japan and the nearby lands of Asia, and in Canada and our own New England. It is said that nowhere on earth is there the gorgeous autumn foliage of the northeastern United States. "Indian summer," so they say, is named from the tints dear to the eye of the savage, and is an American institution.

Yet place does not mean everything. American trees are used in the parks of England to add the color that is lacking in the native trees, for high lights in landscape art. Persons in California, who miss the bright leaves generally lacking on the west coasts of the great land surfaces, try to make up for the loss by planting eastern trees. I remember in the collection of trees, or arboretum, at Stanford University, where there is not much cold weather and where palms thrive, there are some trees of brilliant hue, and I found that about all were from New York and New England. Their



colors come each year even though the leaves may drop before a frost comes. Trees in the Arnold arboretum near Boston, which have come from regions where gay autumn tints are unknown, just keep their green color alone, even though their Massachusetts cousins put on scarlet and gold.





IT MAY be the kind of tree, after all. We plant Japanese maples for their bronze, or red, or yellow color, and they keep the same shade whether they are in the City of Washington or in the State of Washington. The Chinese ginkgo turns to its tawny yellow no matter where it grows. Take the "wayfarer's tree" or viburnum; there are many kinds over Europe, Asia, and America. In Europe, the leaves of all are about the same color, simply green. Many American kinds show beautiful autumn tints. Virburnums from other countries planted here, stay about as they were where they came from, while our viburnums, taken to other parts of the world, turn quite as vivid in their strange homes as they did here.

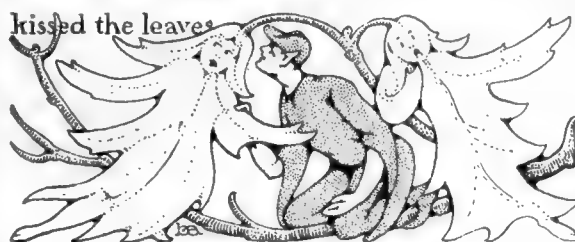
Let us say, then, that something in the tree makes the color, and that these colorful trees grow naturally in certain regions. Scientists have long words to tell about the color changes. I know one man who has written a whole book about the changes in just one kind of grape leaves; and he thinks he does not know a great deal about it, even yet.

THE LEAF is not just a simple layer like a sheet of paper, but has an upper and lower, an inside and an outside skin, with other layers between. We had seen how a locust-leaf miner ate the inside out of the leaves and left only the brown shell of the outer walls. Another insect leaf-miner makes queer light curlycue channels in the columbine leaves of the flower-garden, by eating out the green stuff between the upper and lower layers.

When the leaves have finished their work, the useful green stuff, or "chlorophyll," breaks down and is sapped up. Cool weather may hurry this process of dissolving the green part, but the changes would take place just the same without frost.

The good food for the tree, such as the sugar of the sugar maple, passes from the leaves back into the twigs and branches, so that it is not lost. When

the leaves fall, therefore, they are only the shells of themselves. Part of the flaring color of many trees, by which they really seem to shine, is due to this. The sunlight, no longer stopped by the shade-making green, filters through the leaves, and makes the birches seem to give out a light of their own.



In the passing of the food from the leaves for storage in the stems, it must be kept from the strong action of light; it is thought that the changed color partly helps this. The very young leaves of many plants show these colors in early spring. We see them in ruddy young oak shoots, in unfolding maple leaves, in the downy pinkish leaf buds of the grape. There is said to be a need, also, of protecting the food material as it passes out into the leaves. This may be one of the purposes of "carotin," the yellow color in plants.

WHEN the foods have passed into the tree, it has a clever way of corking up the hole where the leaf-stem was, and of sealing over the place. Thus, when its work is done, the door is closed behind the leaf, and it can sail away.

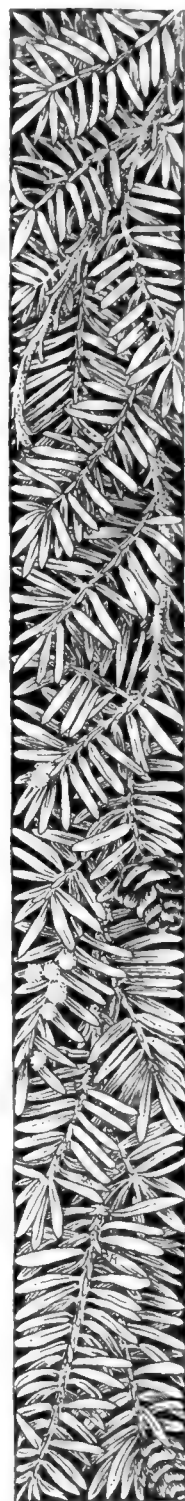
There's another good reason for the fall of the leaves before the snows come; because if they did not let go, tons of snow and ice would cling to them and break the tree down, or at least crack off its branches.

SO WE all agreed that Jack Frost had been given too much credit, and that the real facts were more wonderful than the tales about Jack making the leaves blush by his boldness or by painting them with brush and palette.

"I'm a-going to keep on singing that song, just the same," announced Toto, "'cause I like it!"

"To be sure you are," I agreed. "If we sang only such songs as were written in the cold light of science, we'd forget how to carry a tune."

And all together we sang about Jacky Frost, to show that we bore him no ill will.



War-Time Uses of Forest Products

BY A. W. SCHORGER

Chemist in Forest Products, Forest Products Laboratory, Madison, Wisconsin

ONE of the mysteries of the present war is the source from which Germany obtains the nitrocellulose necessary in the manufacture of smokeless powder, and ordinarily made from cotton. A well-defined belief exists in England that at least part of the nitrocellulose needed by German powder factories is being made from wood; and if this is true it furnishes another instance of the surprising dependence upon wood, in one form or another, on the part of the fighting nations. The actual extent to which forest products are put to use in time of war, both for military purposes and for supplying the nation with some of the things it needs to carry on its daily life, is not generally recognized. Conditions, of course, have changed vastly since the day when Pepys offered up thanks in his diary for "the very good news of four New England ships come home safe to Falmouth with masts for the King; which is a blessing mighty unexpected, and without which we must have failed the next year. But God be praised for this much good fortune, and send us the continuance of His favor in other things."

Wood has ceased to be a large factor in ship building. Sea battles of to-day are fought by all-steel dreadnoughts; even the wooden backing of the armor plate is giving way to other material. Wooden decks alone remain to link the old fighting ship with the new. But warfare on land has developed in a way to give timber an importance in field operations it never had before, while the vast number of accessories needed for the smooth running of the modern fighting machine, from ammunition to absorbent cotton, have led to an extraordinary demand for certain forest products, and have even brought about new uses for wood born of necessity and unheard of a few years ago.

For one thing, there is the matter of explosives. Ordinary black powders contain about 75 parts saltpeter, 10 parts sulphur, and 15 parts charcoal. The charcoal employed must possess special properties, and is made largely from dogwood, willow, and alder. In spite of the advent of smokeless powders, enormous quantities of black powder are still used. It is employed in shrapnel, for which only a moderately powerful explosive is required to drive the bullets. Besides, the smoke produced when the shell explodes is an actual advantage in enabling the gunners to determine the correct range. Black powder is also used to fill the rings of the time fuses with which shrapnel shells are equipped, for which purpose no satisfactory substitute has yet been found. Furthermore, it is used in most armor-piercing shells, which should attain great penetration before they go off, and for which the majority of high explosives would be unsuitable because of their explosiveness on contact.

Another product of the forest, resin, is employed for filling the spaces between bullets in shrapnel, so that on explosion the missiles will be evenly distributed in all directions. Its brittleness and, at the same time, its hardness, together with its low melting point, fit it admirably for the purpose.

The period since the beginning of the war has witnessed a great amount of discussion in England as to whether Germany is actually employing wood from which to make the nitrocellulose for her smokeless explosives. When, after a long delay, England declared cotton contraband of war, it was maintained by many that this would not inconvenience Germany greatly, since she was already making explosives from wood cellulose. During the discussions that followed, it was proposed to destroy the forests of Germany by a giant fleet of aeroplanes armed with bombs; however, as one English editor naively remarks: "This would scarcely be feasible, since about one-third of Germany is forested."

As a matter of fact, little or no reliable information exists in regard to Germany's use of wood for nitrocellulose, and expert opinion in England differs widely about the matter. Sir William Ramsey believes that such explosives are being made, and Mr. Walter F. Reid, who introduced the important gelatinization process in the manufacture of smokeless powder, is emphatic that a nitrocellulose can be made from wood pulp that is equal in every respect to that made from cotton. On the other hand, Mr. Clayton Beadle, whose opinion is entitled to great respect, holds that the difficulties attending proper purification of the wood cellulose previous to nitrification are all but insurmountable.

However this may be, records published by German scientists before the war show that a high explosive can be manufactured from wood cellulose, though at that time its stability was questionable. While it required forty years of experiment to render gun cotton stable, anything like the same time might not be necessary in the case of wood cellulose, for the experience with gun cotton should facilitate solution of the present problem. It is highly probable that the chemical difficulties have already been overcome.

In this connection, it is an interesting fact that the first successful smokeless powder was made from wood about 1865. This powder, invented by Schultze, consists of a mixture of saltpeter and nitrated purified wood. While inferior to gun cotton in ballistic powder, it still retains high favor among sportsmen. Various other explosives, known as "white powder," "yellow shooting powder," and "Bautzen blasting powder," contain nitrated lignocellulose.

Aside from munitions, wood is serving many useful

purposes in the war. Millions of gunstocks are made from American walnut, which is the best wood yet found for the part. A new rifle, it has been estimated, is required monthly for every man at the front. In the modern infantry weapon the wooden stock is prolonged to the end of the barrel, which means just so much more wood needed in its manufacture. So great, in fact, has been the demand by gun makers for seasoned walnut that it has often been necessary to use birch and other woods as substitutes.

With characteristic foresight, the Germans brought portable sawmills with them into France, and have utilized their enemy's forests to supply their need for timber at the front, while reserving their own forests for home demand. The development of trench warfare, when vast armies of men dig themselves in on fronts hundreds of miles long, calls for an amount of timber for trench walls, floors, and braces that is difficult to estimate. Millions of feet of lumber are required also for temporary buildings behind the fighting line and for housing non-combatants made homeless by the fortunes of war. Still more goes into bridges, wharves, and the like. High explosives have made it possible for a retreating army to destroy stone and steel structures behind them in short order, and such structures the pursuing army must have the means of quickly replacing. Wood is, in most cases, the only material that will answer the purpose, and it served the German army in good stead during the pursuit of the Russian army through Poland.

Turning from the materials needed for actual fighting to the no less important ones required for proper care of the wounded, we find Germany, fully prepared for England's embargo, making a soft, absorbent surgical cotton from wood cellulose. Two factories in Sweden also are making this substitute. Slings are made from tough crepe paper, and splints from fiber boards.

Wood is also contributing to the personal comfort of the men at the front. Russian soldiers are wearing paper shirts made in Japan, where such clothing has been in use for many years. The chief raw material for the manufacture of paper is, of course, wood pulp. Paper clothing is warm and cheap, and special water-proofing processes are overcoming its tendency to tear when wet. It may be discarded when soiled, an advantage to the soldier from the standpoint of hygiene. The Germans and Austrians, mainly the poorer classes of the civilian population, use paper vests, socks, and handkerchiefs. Blankets and coats are padded with cellulose wadding. So many paper articles, in fact, are produced for the comfort of the people of Germany and Austria as to lead the Socialist organ, *Vorwaerts*, to declare, "To be without wood is almost as bad as being without bread."

To insure the presence of every factor that tends to eventual success, a country at war needs to maintain its economic conditions as nearly as possible at their normal level. Products of the forest play an important part in many peaceful industries which must be kept going in war time.

Methyl alcohol, the other product besides acetic acid

obtained from the destructive distillation of hardwoods, has a multitude of uses. For one thing, it is essential in the manufacture of many medical preparations. For another, it is employed in the making of aniline dyes, the scarcity of which is being felt throughout the world. It is the source, also, of formaldehyde, one of the safest and most efficient antiseptics known, for the manufacture of which large quantities of wood alcohol are exported to Europe.

The longleaf pine forests of the South furnish 90 per cent of the world's supply of turpentine and resin. In normal times turpentine is used mainly as a solvent in the arts. It is entirely possible, however, should the need arise, to make from turpentine a synthetic camphor as good for practical purposes as the natural product. In the event of the blockade of the Pacific Coast, this should be the means of preserving our celluloid industry, which now consumes the greater part of the 5,000,000 pounds of Japanese camphor imported annually.

Resin, the use of which in shrapnel has already been mentioned, is employed mainly in the manufacture of cheap soaps and as a size for paper. So acute has become the scarcity of resin in Germany that the Prussian Minister of Agriculture has suggested such measures for increasing the supply within the empire as distilling resinous wood and collecting the oleoresin which exudes from trees peeled by deer. Prices being paid for resin by the Central Powers are almost fabulous. Curiously enough, a substitute for paper size, recently proposed by a German scientist, has wood tar as its base.

In connection with the use of resin as size for paper should be mentioned the fact that in time of war the demand on the forests for print papers deserves serious consideration. Of the 6,000 newspapers and periodicals in Germany and the 3,000 in Austria at the beginning of the war, it is estimated that some 1,100 of the German and 900 of the Austrian have since suspended publication either through inability to obtain paper or because of its prohibitive price. Germany has always imported large quantities of pulp wood from Sweden and Russia, so that cessation of importation of Russian pulp wood and American resin is a partial cause of the trouble. On the other hand, German war literature has been augmented by some 7,000 books and pamphlets since the beginning of hostilities; and it is the invariable rule in all countries that the demand for newspapers and periodicals of all kinds increases enormously in a time of national crisis. The total daily circulation of French newspapers before the war, for example, amounted to approximately 7,000,000 copies. Their circulation has now increased to 15,000,000 daily, in spite of the suspension of a number of journals. The bulk of print papers is made from spruce and balsam fir. Experiments at the Madison Laboratory of the Forest Service have shown, however, that satisfactory newspaper can be made from some seven or eight other American woods, which places the United States in a position of preparedness, at least so far as the production of paper is concerned.

The binder twine, used everywhere in the United

States in connection with harvesting our crops, is at present made from sisal imported from Central America and Mexico. As a result of the disturbed conditions in Mexico, American twine manufacturers are seriously embarrassed for raw material. A substitute has been sought in paper twine, and experiments in this direction are still under way.

Strong cordage, ropes, burlap, and similar articles can be made from paper, and, in fact, are being made from it. Our common burlap and course bags are ordinarily made from imported jute. Shortly after war was declared the price of burlap bags increased so greatly that one large grain dealer seriously considered taking the profit to be derived from the sale of his reserve stock of bags and going out of business. In the case of a war of our own, the United States should be in a position, through its enormous supplies of wood fiber, to meet all, or at least the great part of, its needs for the twine necessary to harvest its crops and for substitutes for burlap bags and hemp ropes.

The American public, perhaps unawares, has long

been accustomed to articles of clothing made from wood under these terms "fiber silk" and "artificial silk." The viscose process transforms wood pulp into a strong, durable, lustrous thread that may be woven into any desired fabric; accordingly, the morning newspaper and handsome cravat may have a common origin.

Finally, should the South ever be invaded and its cotton crops seized, a happening which military and naval authorities regard as not at all unlikely in case of war with a strong power, the cellulose from our forests would have to serve us, not alone for explosives, but for textiles as well. Thus, in more ways than in the production of lumber, the forest may serve a nation called upon to meet the conditions of modern warfare, and for that matter, too, of commercial progress in times of peace. Nor is it beyond the bounds of possibility that the investigations and experiments which are being carried on at the Government's Forest Products Laboratory and elsewhere may find still other uses for wood that will add just so much more to the importance of the forest in our national life.

Under Fire in War Zone Forests

(Passed by the Field Censor September 13, 1916)

BY LIEUTENANT H. K. ROBINSON

Twenty-first Howitzer Battery, Canadian Expeditionary Force

INFORMATION as to the changes in forest management in the war zone, caused by the change in supply and demand brought about by the war, might easily be considered to be of military value to the enemy and so rejected by the censor, and as I am not allowed to name any places I might write about, I will merely give for the readers of AMERICAN FORESTRY some general information regarding forest conditions in northern France.

Speaking generally, the artillery, machine gun and rifle fire appear to have surprisingly little effect on broad-leaved woods and seem to kill outright the coniferous woods, if close up to the front line trenches. I have seen many oaks, beeches, planes and other hardwoods badly knocked about by shell fire and yet vigorous, while Scotch pine, spruce and other conifers have died after being worried a bit by splinters or shrapnel bullets. Woods near the front line always come in for a good deal of shelling as they are a cover from view by hostile aircraft. It is easy to imagine quantities of engineers' stores and ammunition depôts and infantry dug-outs under their cover, so a wood in range of hostile artillery is by no means the safest place in which to loiter. I have often seen a sudden, intense fire opened on a wood for two or three minutes, apparently in the hope of catching people in it unawares. I know one such wood which has been shelled almost daily for many months, both with

high explosive shells bursting on percussion and with shrapnel, and the front of it swept at frequent intervals with machine gun fire. If you were to visit it now, all you would notice are the shell holes in the ground, which are very numerous, and a few trees rather damaged by direct hits or splinters. The wood, as such, has suffered no damage whatever.

I remember a blank piece of road embankment which was some distance behind the German front line. It seems to have offended the eye of some really cultured enemy, for one day we found it had been neatly planted with young pines about one metre apart. This irritated my major, M. N. Ross, formerly of Biltmore, and now landscape architect to the Government of Saskatchewan. He thought it looked as if the German was behaving as absolute owner and not merely as a sojourner in thus beautifying the place. So the next day a shell from our battery landed in the middle of it. We had to shell that road and this was as good a point as any and shells sometimes drop short a few yards. Our shells make rather a mess and that one left only three pines standing at the edge of the bank. The damage was never repaired and I fear that that tree lover, probably from South Germany, regards us now as Philistines of the worst sort.

I believe the Germans, taken all round, use far more forest materials for their war work than we do, but that

is only natural, as their minds run more to timber than do the British, a result of the greater per capita wood consumption of Germany than of Great Britain in peace times. It is to me one of the most striking differences between their trenches and dug-outs and ours. It is interesting to notice the bird and animal life to be seen almost everywhere along the battle front. They seem in no way put out by the firing and very seldom do you see any killed. I remember only two cases, one a hare killed by a small piece of a shell, and the second a swallow whose head was taken off by a shrapnel bullet. A large number of his feathers went to Canada in letters from our gunners, mostly to ladies, and with suitably pathetic comments. The battery officers have to censor the outgoing mail.

This letter is being written under some difficulties, as there is a steady bombardment going on and the acetylene lamp goes out about once a minute from the concussion. What beats me is why it stays alight so long. I suppose there must be a gun firing straight over this dug-out at the rate of one per minute.

Back in the spring I noticed a bird jump every time a gun went off or a shell burst and I wondered at him. Through my telescope, however, I saw that he was a migrant and the first of his kind I had seen this year. I wonder what he thought about it?

I am informed that the wild pigs in the firing area could not stand the noise at any price and have appeared as much as sixty miles away in woods where they were quite unknown before.

I am inclined to think that the area under forest in the war zones will be increased after the war, as there is so much destruction being wrought that the owners, if living, will not have the heart or means to reclaim the land for farming, and the armies have used so much wood that timberlands will look like a good investment to others.

NEW HAMPSHIRE CONFERENCE

THE Forestry Conference under the auspices of the Society for Protection of New Hampshire Forests was held this year at the Crawford House, Crawford Notch, New Hampshire, in the midst of the National Forest purchase area, and adjoining the state forest of 6000 acres which protects the slopes of the Notch. The meeting was largely attended. William L. Hall, of the Forest Service, explained the policy to be pursued in managing the lands acquired by the government, which now total over 300,000 acres in New Hampshire alone. The forests on these areas are to be utilized to produce revenue, part of which, under general statute, is paid to the counties in lieu of taxes. Every precaution is taken to preserve the scenic beauty of the forests and to avoid fire risks.

Mr. W. R. Brown, member of the New Hampshire Forestry Commission and a director of the American Forestry Association, presented, in a carefully prepared paper, a plan for mutual fire insurance of standing tim-

ber. Printed copies of this paper can be obtained from him at Berlin, New Hampshire.

Dr. B. E. Fernow, Dean of the College of Forestry, at Toronto, in a talk on forestry of the past and future, advocated the extension of public holdings of absolute forest land as the most effective method of securing forest production. In a discussion following, as to the merits of attempting to regulate the cutting of timber on private lands, he brought out the fact that Prussia, the most autocratic of all German states, preferred to buy poor sandy soils and manage them as state forests rather than attempt to force the owners to practise forestry against their will.

The woodlot was discussed by Professor F. Roth, Director of the Michigan Forest School at Ann Arbor, who told about methods of estimating its standing timber,—and by Professor J. W. Toumey, Director of the Yale Forest School, who advocated commercial planting for the establishment of woodlots and cited a tract of three acres planted to white pine in 1891 near Keene, New Hampshire, on land too steep to cultivate, which sold last year for \$1000, or \$333 per acre. A lantern-slide lecture was given by Mr. Shurtliff, landscape architect, under whose direction vistas and other cuttings have recently been made to permit tourists to obtain views of the mountains from the road traversing the Crawford Notch.

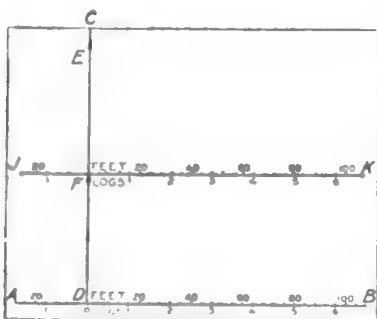
An important conference was held at this meeting by the Interstate Committee on the White Pine Blister Rust. Progress reports by government agents and state foresters who have been operating under the recent federal appropriation of \$30,000, showed that this summer the disease has spread upon currant bushes over wide areas in every New England state, and is present in Minnesota and Wisconsin. Testimony was presented showing that the spores may be borne distances of from two to twenty miles on the wind, producing infections of the currant leaves which, in the fall, will infect white pines in turn. Legislation was recommended which will give to the state officials the necessary power to combat the disease. It was decided, as a result of the conference, that a united and determined effort be made by every state to get control of this rust before it is too late. Specimens were shown of the disease in young white pines, and evidence given of plantations now twenty feet high, in which the rust had infected every tree and was killing the entire grove by girdling the trees.

Many persons are mistaking a browning of the needles of the white pine for the presence of blister rust. This effect has nothing to do with the rust, which is wholly a bark and wood disease. The browning of needles is caused by climatic factors not wholly understood, and most trees recover.

THE stand of timber on the two great National Forests in Alaska is estimated by the Forest Service as over 70 billion board feet, while the annual growth will, it is said, produce of pulpwood alone enough for the manufacture of three thousand tons of wood pulp a day.

How to Measure Height of Trees

AN instrument for measuring the heights of trees can easily be made at practically no cost. Take a piece of half-inch board 7 by 9 inches and plane it smooth on all sides. Draw the line *AB* $\frac{3}{8}$ of an inch from the lower edge and parallel to it. Two inches from the left end of the board draw *CD* at right angles to *AB*. Make a mark at *E*, $6\frac{1}{4}$ inches from *D*, and another at *F*, $3\frac{1}{8}$ inches from *D*. Now draw a line *JK* through *F* parallel to *AB*. Start at *D*, lay off inches and quarter inches on *AB* in both directions, marking *D* as zero and putting down the number of inches from *D* to each inch mark. Do the same for the line *JK*. Take a brad or small nail and drive it in carefully on the line *JK* about an inch from the edge of the board. Drive it in until the point comes out on the back of the board; then pull it out and drive it in from the back until the point sticks out about one-fourth inch from the face of the board. File off or cut off with pliers any part of the brad that projects from the back of the board. In the same way insert another brad near the other end of the line *JK*. These



A SIMPLE HOME-MADE INSTRUMENT FOR MEASURING HEIGHTS OF TREES

brads are the sights, and it is important that they be straight and true.

Now take a piece of straight, heavy wire 10 inches long, and bend one end of it into a loop about an eighth of an inch in diameter. The center of the loop should be in line with the straight part of the wire. Fasten this piece of wire loosely to the board at *E* with a half-inch screw, so that it will swing freely when the board is on edge. The loop should be big enough to fit loosely over the shank of the screw, but small enough so that it will not slip off over the head.

Screw a piece of wood about 6 inches long, 1 inch wide, and half an inch thick to the back of the board to serve as a handle, and the height measure is complete.

How to use it.—To measure the total height of a tree, stand at a distance of 100 feet from it and hold the instrument in the right hand in such a way that the pendulum swings freely but very near the board. Sight along the brads at the top of the tree and let the pendulum come to rest. Then with the left hand press the pendulum against the board without giving it a chance to change its position. Now read off the number of feet in height on the lower scale. If the wire crosses the line 5 inches from the point *D*, it indicates that the tree is five 16-foot logs or 80 feet high above the level of the eye. Now sight at the foot of the tree and take another reading. If the pendulum hangs to the left of *D*, that is, between *A* and *D*, add the amount indicated to the first reading, and the result will be the total height of the tree. Thus, if it hangs half an inch to the left of *D*, add half a log or 8 feet to the first reading, making a total of $5\frac{1}{2}$ logs, or 88

feet. But if the eye is below the foot of the tree, the wire will hang to the right of *D* (between *D* and *B*) and then the amount of the second reading should be subtracted from the amount of the first. Thus, if the first reading is 96 feet and the second is 12 feet (to the right of *D*), the total height of the tree will be 96 less 12, or 84 feet. If the tree is less than about 75 feet

high, or if it is difficult to see the top at a distance of 100 feet, the observer should stand 50 feet from the tree, but in this case the readings are on the line *JK*.

When the instrument is sighted the pendulum can be kept in position by tilting the hand slightly to the right. This brings the wire against the board and holds it in place so that a reading can be obtained. Care should be taken, however, so that the wire will not slip after the board is tilted.

In the example given, the total height of the tree has been measured. It is often of more practical importance to measure the height to a point on the tree beyond which there is no merchantable saw timber. This measurement is made in the same way as that described above, except that the instrument is pointed at what will be the top of the last log when the tree is cut, and then at the point where the top of the stump will be.—*Farmers' Bulletin* 715.

Western Public Lands and National Forests

BY HERMAN H. CHAPMAN
Professor of Forestry, Yale University

THE policy of National Forest reservations will continue to be attacked as long as there exist persons whose fundamental creed is the doctrine of unregulated private exploitation of our remaining resources. One of the most plausible arguments advanced by these propagandists is that of the paralysis of state development through the retention by Uncle Sam of an immense proportion of the total area of these Western States, upon which of course no state taxes can be levied, and which, it is claimed, rest with oppressive blight upon these struggling communities, preventing all natural growth and development. Tables of areas have been quoted showing as high as 92 per cent of the area of a state, retained by a grasping government, with no relief in sight.

When half truths are quoted and impressions created by reliance upon the unfamiliarity of the reader with local conditions, it is necessary to let in the light.

Figures are now available to show not only the areas in public ownership, but the status of these lands, and their character.*

These statistics are best expressed in terms of per cents of the total area of each state. The States shown in the table below are the eleven western public land States containing National Forests and lying west of the plains.

The first fact shown by this table is that two-thirds (65.5 per cent) of all the national lands in these States are not reserved or retained, but are open to entry and acquisition, subject to all the public land laws, homestead, desert land, or other statutes and therefore have no bearing upon the discussion. These

lands are in public ownership to-day because they have not sufficient value for any purpose to justify private persons in acquiring title to them. Being valueless, they could produce no revenue in taxes were they to pass to private ownership, for individuals would not retain them. The character of these lands is either waterless, non-irrigable desert, or barren rocky tablelands, crags and bluffs.†

Yet these areas, unexplained, have furnished the backbone of the statistics cited.

There are reservations of land in these States for several purposes, but the only policy affecting large areas forming an appreciable per cent of the state, is that of National Forests. The total per cent actually reserved, shown in column three, is seen, in column four, to consist almost wholly of National Forest lands. There can be no doubt that these misquoted and unexplained statistics are aimed directly at the policy of National Forest reservations, and this fact is usually frankly admitted.

The National Forest areas equal 17.8 per cent of the total surface of these eleven States. Is this area too large, and is its retention a drawback or an advantage to the people of the States affected?

We must first consider the fact that all the mountain ranges of the West are included in these forests. There is some possibility of using desert land by irrigation. Mountain ranges are worthless except as a reservoir for

snow. Vast areas are treeless rocks. It would be difficult to say what portion of these National Forests is worthless for any other purpose than watersheds, but it could easily equal one-half of their total area.

How about the other half? This constitutes the national timberlands, and includes all the more inaccessi-

	Total per cent owned by United States	How divided		Division of land reserved for public purposes		Per cent of total area granted to State by National Government
		Unappropriated and unreserved lands open to entry	Reserved for public purposes	National Forests	Other Reservations	
Arizona.....	70.2	50.7	19.5	17.2	2.3	17.1
California.....	44.1	21.0	23.1	20.4	2.7	9.3
Colorado.....	49.6	28.5	21.1	20.2	.9	9.7
Idaho.....	65.5	30.6	34.9	33.2	1.7	12.2
Montana.....	43.4	23.8	19.6	17.4	2.2	7.3
Nevada.....	89.8	79.0	10.8	7.5	3.3	5.6
New Mexico...	49.8	38.4	11.4	11.0	.4	16.2
Oregon.....	49.3	26.1	23.2	21.6	1.6	8.7
Utah.....	78.9	64.2	14.7	14.2	.5	17.3
Washington...	30.8	4.3	26.5	23.0	3.5	9.0
Wyoming.....	68.2	50.5	17.7	13.5	4.2	9.8

*Senate Document 316, Part 2, Table 1, Sixty-third Congress.

†For location and character of these unreserved and unappropriated public lands, see Circular 420, Department of Interior, July, 1915.

ble and least valuable commercially of the Western forest areas. A large per cent of this timber must be kept as a mere watershed protection, since the cost of logging it may remain prohibitive. The remainder has commercial value or will have in time as markets improve, transportation systems are built and private stumpage is cut.

This residual area of commercial timber, not exceeding an average of 10 per cent of the area of the Western States, and probably nearer 5 per cent for the region as a whole, must form the basis of the whole contention, for it constitutes the resource purposely retained by the nation.

Let us first consider the claim that these Western States should receive as grants the lands in the National Forests. The government has been exceedingly liberal with all public land States both East and West of the Mississippi River. The final column in the table shows the per cent of the area of each Western State granted to the State from the public domain up to this time. The average area, weighted, is 11 per cent. The inclusion of South Dakota, Minnesota and Arkansas, each of which contains large National Forest areas, raises this average to 11.75 per cent.

By contrast, fourteen Eastern public land States have received in grants 12.25 per cent of their total area, almost an exact equivalent. The actual acreage granted to the Western States is, of course, far greater, due to their larger area. Florida is in a class all by itself. The Swamp Land grant secured to this State 58 per cent of its total area.

Any substantial grant of National Forest lands to Western States would be a discrimination in their favor as against other states; and there exists no valid argument for such additional land grants. The total gifts to Western States now exceed 80,000,000 acres, and this does not include the immense private grants to railroads.

The final argument for dismemberment of these National Forests is the plea for state and local revenue from taxation. This would mean that state ownership would be transitory as the State cannot tax itself, and that the desired goal is private acquisition of the timberlands. The old plea that agricultural lands are withheld from settlers has been so thoroughly exploded by wide publicity that even stump speakers find it an unprofitable argument. The question narrows down to that of private versus national ownership of the public timberlands, and the economic effect on local communities.

To the forest, private ownership will be destructive. These slow-growing species present no future for individual investment. In parts of the northwest coast it may pay to grow timber, but elsewhere, in the West, a clear cutting and the permanent ruin of the forest can be expected. By contrast, public ownership, as already proved, means methods which insure a second growth and a perpetual forest cover. The tax revenue derived from private timberlands will, therefore, terminate with the logging.

Furthermore, it is being conclusively shown that owners of private stumpage in these States cannot carry the

burden of an annual taxation for standing timber for long periods. The effect of such taxes for an extended period of forty to fifty years is to practically wipe out the present stumpage value, and produce a chain of aggravated economic evils of which over-production in the mills is the most prominent symptom.

No move to increase the amount of privately owned stumpage is justified until these evils are overcome. State politicians who close their eyes to the welfare of the lumber industry, on which, to an enormous extent, the community prosperity depends, and look solely upon possible increase in revenue from taxes, are in the same class with land speculators who do not care what happens so long as they are given an opportunity to juggle with the values of timber stumpage now beyond their grasp.

But what is the effect of national ownership? In the first place, the absolute right of the nation to retain these forest lands is unquestioned. This principle was decided by the United States Supreme Court in 1835 and is admitted even by the most rabid opponents of the system.

Are the states without revenue from these forests? For on this point seems to hinge the whole weight of the argument.

A forest property, whether belonging to states or individuals, must be protected from fire. Idaho spends 2 to 4 cents per acre on her state lands for this purpose. Otherwise losses greatly exceed the cost of their prevention. The states would either have to spend huge sums on the protection of these areas or speedily shift this burden to private shoulders. At present, this entire cost is carried by the national government, which last year spent \$5,281,000 on the administration of these areas. States could not do the work successfully for less; hence this is equivalent to a direct saving in state expenditures.

In the second place, the counties receive by national statute 35 per cent of the gross income from all sources, earned by the Federal Government from these forests, and free from the expense of collection and administration. The forests earned last year \$2,481,469.35, and the states' share amounted to \$610,797.75. This sum will rapidly increase as the resources of these forests are developed. In this connection, the sum of \$244,319.10 out of the total of administration expense was spent to construct roads and trails.

Still a third source of revenue was provided this year by a congressional appropriation of \$10,000,000 for the construction of roads within or partly within the National Forests, one-tenth of which, or \$1,000,000, is available each year until expended. The effect of this law is to increase the return to the communities to equal two-thirds of the total income from the forests, and at the same time expend upon their administration a sum at present twice as great as the total of this income received; so that, if we consider administration expense as saved to the state, the community receives under the present plan from the government \$2.77 for every \$1.00 yield in income from the forest resources. In the narrower sense, considering only the income, the state is given 65 cents for every dollar earned, leaving 35 cents to the government or public at

large, as the equivalent of an expenditure of \$2.12, which is the ratio of expense to income at present. The nation is, therefore, expending six times as much for the benefit of the states on account of these forests as it receives in net revenue from its own resources within the forests.

This course is justified by the honest intention of the government to hold out every possible incentive for local development, and by the enormous benefit both to these localities and to the nation at large from the perpetuation of the forest as a productive use for waste lands. The revenue, under national control, will be maintained perpetually and should continually increase. By contrast, we would have, under private exploitation, a period of excess during which states would endeavor to squeeze the largest possible amount of tax revenue from this timber, and the owners would use every effort to destroy it as quickly as possible by logging, to escape the burden, leaving a barren waste from which no further revenue could ever be extracted and which would revert to the state for unpaid taxes. The next step would be an attempt to secure the purchase of those ruined lands by the National Government for forest reserves.

The American Forestry Association is pledged to vigorously oppose all efforts to inaugurate such a cycle of ruin and folly and to continue to champion the principle that our remaining national timberlands shall be treated rationally as a productive business, managed by the nation for the benefit of the localities in which they lie and for the people as a whole.

SCOTCH FORESTRY PROBLEMS

A DEPUTATION from the Royal Scottish Arboricultural Society has waited on the Scottish members of the British House of Commons to urge the creation of a separate department of forestry in connection with the Board of Agriculture for Scotland. Its members admitted that the great value of forestry had only been recognized during recent years, and they argued that now was the time to make it a national responsibility, especially in view of the impending necessity of buying huge quantities of lumber to take the place of that destroyed during the war.

The argument was put forward that the great question of securing employment for the multitude of discharged soldiers which will fill the labor market at the end of the war is being very generally discussed; the value of such schemes makes a practical and immediate appeal to many. Afforestation is, in fact, as Lord Lovat, one of the spokesmen of the deputation, maintained, one of the cheapest ways of settling people on the land, at any rate in the Highlands. It would be possible to put one man on the land for every 100 acres planted, and later one man to every 25 or 50 acres. He thought, moreover, there were certainly not less than 2,000,000 acres, in the Highlands alone, suitable for forestry. Every man settled in these Highland glens in connection with afforestation would be a definite addition to the population and would displace no one.

FAMOUS FOREST BURNED

THE wonderful forest of Tatoi, the pride of the late King George of Greece, was destroyed when fire reduced to ashes the summer residence of his son, King Constantine. The tens of thousands of dollars spent in cultivating a flourishing pine wood, as an example of what might be done with forestry in barren Attica, have been burned up as completely as if the banknotes themselves had been thrown in the fire. Tatoi played a large part in the history of Greece. Here the Spartans established themselves in 413 B. C. to cut off the supply of grain and foodstuffs bound into Athens from Eubea, with the purpose of starving out the Athenian population. And in 404 B. C., while Lysander blockaded Athens and the Piræus by sea, the Spartans descended from the vicinity of Tatoi, attacked and forced the capitulation of Athens, ending the Peloponnesian war. The burnt forest, laboriously planted and protected, was considered to be a memorial to the past greatness of Greece.

SOME IDEAS IN TREE PLANTING

BY STERLING ROUSE

ONE of my neighbors, Charles Moore, had thirty-three peach and apple trees to plant last spring. Part of the orchard site was in stubble and part in blue grass sod.

I decided to try a method new to this section on the sod land. With a spade I first cut the sod in a four-foot circle and turned it back out of the way. I then put down a bore-hole about thirty inches deep and loaded each hole with a half stick of low-grade dynamite to loosen up the subsoil. After filling the cavity at the bottom with subsoil and manure, the trees were set and rich top soil used to fill in around the roots. The sod was then laid on top of all around the tree, grass-side down. This proved fine for holding moisture in the ground and delayed the growth of weeds.

Another idea new to this region was employed in his old orchard. He had some apple trees that had never borne fruit. I used a stick and a half of dynamite to blast out each tree and then set the young trees in the holes made by the blasts, thus killing two birds with one stone as it were. The trees were planted in the same way as the ones put in the sod land. They are all doing finely. The cost of setting the trees was 10½ cents per hole.

Mr. Moore also had some black stumps he had been working around for ten years; he had tried burning them, but as the roots were near the surface, they interfered with his plow and harrow. These stumps ranged from sixteen inches to three feet in diameter. In two hours, I had them out, at an average cost of thirty-three cents per stump. He said he wouldn't work around them again for twice the cost of getting rid of them; that he never realized how little it would cost to dispose of them.

Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

EDITED BY J. J. LEVISON, B.A., M.F.

THE TREE CENSUS

By A. OAKLEY SMITH, Park Commissioner, City of Mount Vernon, New York

IN the present day of system and high efficiency, it is necessary for the manager of any business or organization to have a very accurate knowledge of his stock, territory and working capital; and the newly appointed city forester, or city arborist, is no exception to this rule. In fact, when such a department is being organized, it is well to spend considerable time in a preliminary survey in order to get the situation well in mind before mapping out a course of procedure, and very early in the game one sees the value and necessity of some form of a tree census.

The question arises, What form is best adapted to the particular case in hand and for what reason? The different styles already tried vary greatly in detail, accuracy and expense of production. The simplest form is a mere tabulation on sheets of paper, or in books, of the number and species of trees found along the different streets and a few notes as to their condition.

The other extreme is the card index system, which devotes one card for each block in the city and has every tree accurately located, the species, size and condition being indicated by symbols and notes. When completed, you have an entire map of the city dissected and filed by blocks.

Such a tree census is no doubt extremely accurate and valuable, but, can the department justly afford the expense at the beginning of its career when every cent counts?

The expense in time and trouble of keeping this system up to date, even after completion, makes one question its desirability even in later years when the Shade Tree Commission, or similar body, is well established. The initial cost necessitated by a field crew of three men and

expensive office work certainly makes this elaborate census impractical during the first years, especially as the important facts may be obtained by cheaper methods.

This method, finally adopted in Mount Vernon, New York, was designed to gain only the data of practical value and at a minimum expense and seems to have fulfilled the requirements. The field work is done by one man and data are taken on cards 5 inches x 8 inches ruled as Figure 1.

In tabulating the trees they are thrown into one of three classes. The *Sapling Group* includes all trees up to 5 inches caliper or 25 feet high and represents the potential capital, trees not yet of actual value as shade trees.

The *Thrifty Group* comprises all vigorous trees above the sapling group which may be expected to remain intact for at least five years. This group represents actual capital of growing stock on hand. This thrifty group might be broken up into diameter classes but the expense thereby added does not seem to be warranted. A general idea of the size of this class is noted by recording the average diameter for each block. All the trees visibly failing or not expected to be standing for five years hence are classed under the head *Old*.

One of the most important functions of a Shade Tree Commission is to plant trees, and in order to have a fair distribution of planting over the city and make the

greatest showing with the means at hand it is necessary to know how many trees are needed in the various sections of the city. These data are readily recorded on these cards block by block. Another important item is that of giving proper protection to the trees by guards. This infor-

SHADE TREE COMMISSION, MOUNT VERNON, N. Y.

SECTION		DATE	
Average diameter of thrifty trees of section			
Total number seedling guards			
Number of trees to be planted			
NOTES			
OLD			
THRIFTY			
SAPLINGS			
Norway Maple			
Sugar Maple			
Red Maple			
Silver Maple			
Sycamore Maple			
Elm			
Linden			
Horseshoebush			
Am. Sycamore			
Oriental "			
Red Oak			
Pin Oak			
Black Oak			
Scarlet Oak			
White Oak			
Ash			
Caroline Poplar			
Catalpa			
Sweet Gum			
Sour Gum			
Tulip			
Locust			
Cherry			
			TOTAL

METHOD OF KEEPING A TREE CENSUS

FIG. 1.—By this plan the trees are divided into three groups—Sapling, Thrifty and Old—and the work of making the census can readily be done at moderate expense, and on this account is preferable to the more detailed card index system.

increased demand has been greater than the diseased wood could supply. The result is a partial shortage of water supply among the branches which causes the scorching to appear very suddenly. This is the way the matter has been figured out by the specialist on pine troubles, after a thorough investigation of the sap wood and knowledge of the circumstances. We believe this diagnosis to be true, although it is not possible with our present facilities to actually prove it definitely by experiment. Records kept for several years upon diseased trees showed that most of them recovered the second year, and that only a relatively few died from the effects. So far as we can judge, there is no treatment which is likely to aid this trouble.

Q. I am enclosing a bay leaf, from one of the ornamental trees in our show-room. The tree is generally affected in this way and we would like to know what to do for it. Will you be good enough to advise?

F. R. C., *Hollywood, California.*

A. An examination of the bay leaf which you send shows that the tree is infested with sucking insects. The leaves should be washed, on the under side, with a solution of whale-oil soap, one pound to ten gallons of water, or with a solution of nicotine or tobacco dust. These insects are common on bay trees and the treatment may have to be repeated many times in the future. If washing the individual leaves is too big a task (depending on the size of the tree), then apply solution by spraying. You will find where the plants are kept indoors too much they are more likely to contract the infection.

Q. We have nine acres on the outskirts of Augusta, Georgia, on which are growing some very beautiful trees. We have three oaks, whose diameter will average about six feet, then there is a sugarberry whose diameter runs about eight feet besides perhaps a dozen wild olives whose diameters will run about three feet, and a cherry tree with a diameter of about three and a half feet and which is about one hundred feet tall. I mention these as an indication of the very fertile soil upon which these trees are growing. A few inches under the surface we have a red clay, which, judging from the growth of the trees and vegetation in our garden, must be well suited for plant life. On this place we have two walnuts, black walnut. These trees will run something over three feet in diameter and are very fine specimens, but for the past several years we have noticed the ends of the limbs beginning to die, and it is quite frequent that we find dead limbs of considerable size. Last week I happened to be up there and was talking to two so-called "tree doctors" and they both pronounced the ailment "borers." They stated that same can be eliminated and the tree cured by spraying. The cherry also has a good many dead limbs and the men said that the same trouble was affecting it. Of course, a tree the size of these cannot be effectively sprayed, but is there not a wash that we can apply to the tree on its trunk and larger limbs that would help?

R. W. H., *Savannah, Georgia.*

A. It is quite common for walnuts of the size of yours to show dead ends. Sometimes the primary cause is old age and a hollow trunk and sometimes boring insects. Old walnut trees have a tendency to develop a decayed center and decayed pith in main limbs. If borers are present, then there should be seen on the outer bark a number of small holes which lead to the burrows of the grubs. In such cases, inject carbon bisulphid into the burrow and clog the hole immediately after injection with soap, so as to retain the deadly fumes generated by the carbon bisulphid within the burrow. Under any conditions, spraying the trees will not affect boring insects because the latter grub underneath the bark in the woody tissue and any application of poison on the outside to the bark or the leaves will never reach them. In the case of the cherry trees, if you see any gummy exudations from the bark you may suspect the presence of boring insects underneath the bark and the remedy in that case is to grub them out with a penknife and remove the borer bodily. Injections will not help because the gummy substance will not permit the injected

material to enter the burrow. The knife is best in this case and here, too, do not spray if you are fighting a borer in the inner wood. It may also be wise to "cut in" the branches of the cherry to compact the crown. This will rejuvenate the tree and cherry trees respond to the treatment.

Q. I have a number of Silver Poplars on my place here that are in some way affected. Many of the leaves are drying up and falling off, others are turning yellow, and the tips of the new growth are drying up and breaking off. I am sending you a couple of these tips. You will notice in each of them is a spot where they are broken and which appears to be stung by some insect and each side of this sting the wood is *dry* for about one-quarter inch. About a month ago I first noticed that the trees were affected, and then discovered many small green lice *under* the leaves. I sprayed the trees twice with arsenate of lead, but after each application had a heavy rain. The lice *now* have disappeared but the trees look badly. If you can inform me what is the trouble and how to overcome it, I shall be indebted to you.

S. H. W., *Guilford, Connecticut.*

A. An examination of the leaves you send shows that the poplars have suffered from winter's frost and summer scorch, following frequent dampness. Last winter was a hard one on poplars as well as on other tender plants. Hundreds of poplars have been killed outright in Connecticut and in the vicinity of New York. This summer there was a series of hot days following days of extreme dampness, and this caused considerable scorch. Our advice would be to "cut the trees in" this fall. Cut in very hard, depending on the size of the tree. Cut off most of the ends and altogether make the crowns of the trees compact and bushy. There is no evidence of any special insect on the leaves. Whether there are any borers in the branches, only an investigation would show.

Q. I planted in my garden this Spring a number of fruit trees, apple, plum, pear and peach. They took root and came along well, but now the leaves are turning black and falling off. On the stems there are "bunches" of small green insects. Can you tell me what they are and what to put on the trees?

F. N. H., *New York City.*

A. Replying to your recent inquiry, the insects in question are small thrips, quite common on the under side of leaves in the summer time. Spraying the infested leaves, on the under side, with whale-oil soap solution, one pound to ten gallons of water, will destroy these insects. The season, however, is so far advanced that it is hardly worth while spraying this year, and I would suggest deferring it until early next summer.

Q. I have two very fine horse chestnut trees on my farm in Chester County which have just developed "rusty" leaves. The leaves particularly towards the lower branches are turning brownish, rusty and drying up. Can you tell me what to do? Perhaps you can tell me what the trouble is. Shall appreciate your advices.

F. B. F., *Haverford, Pennsylvania.*

A. It is quite characteristic of horse chestnut, both in this country and abroad, to have their foliage turn brown early in the summer. The cause is a fungous blight on the leaves. It will not kill the tree and a close examination will show that the next year's buds are already well formed. The direct responsible factor is drouth and one will, therefore, notice more of this trouble on city streets than on open lawn and more in dry seasons than at periods when there is plenty of rain. Digging a shallow trench around the tree a few feet away from the trunk and constantly filling it with water will help to stay the difficulty.

Q. What can I do for our maple trees? All over town they are infested with tiny white cotton-like patches.

M. H., *Big Rapids, Michigan.*

A. Are they sugar maples or silver maples, and do the patches appear on the twigs or the trunks? If they are sugar maple trees and the patches are on the trunk, then the trouble is an insect and the thing to do is to wash the affected parts with whale-oil soap solution, one pound to ten gallons of water. If they are silver,

or red maples and the infestation looks like pop-corn on the slender twigs, it is the cottony maple scale and in this case clip off the affected twigs.

Q. I noticed quite a number of holes around the trunk of my walnut tree, but I am not sure as to whether these holes were made by borers or woodpeckers. It has been suggested that we bore one-inch holes about three inches deep every eight or ten inches circling the trunk of this walnut tree and filling these holes up with sulphur, the idea being that the sap as it goes up would become somewhat contaminated with the sulphur, which is slightly soluble, and this in turn drives off the borers—they evidently not liking the sulphur flavor. We understand this works very well indeed with oak trees, and I was just wondering if it would not be wise to try this on the walnut tree.

J. L. H., *Atlanta, Georgia.*

A. With further reference to your walnut trees and the suggested method of treatment, I must tell you that I have no faith in the sulphur method, as suggested. It has been tried by our specialist years ago in several species of trees and it never worked. Moreover, considering the growth and requirements of trees, it does not seem reasonable that it should work. Woodpeckers generally do not bore as deeply as insects, and very frequently they form a ring of holes around the tree, while the burrows of insects are usually scattered all over the bark.

Q. I have several nice pear trees on my place in Thompson. Windham County, Connecticut. Up to about six weeks ago, they

looked to be thriving nicely, were full of good fruit and the leaves were green and healthy, then they commenced to turn black and fall off. Now in some places the trees are bare of leaves and the fruit has stopped growing, and will be of little use. What is the cause and is there a remedy? E. W. S., *New York City.*

A. I am sorry to learn of the condition of your pear trees. Your description answers a disease known as "fire blight," which has lately done considerable damage to pear trees all over New York State and also Connecticut. It has been known for many years, and cutting off and burning the infested parts is the only practical remedy I know of, and I sincerely hope that this will prove effective in your case.

Q. What shall I do to improve a linden tree that does not seem to grow? A. E., *New York City.*

A. Fertilize it with well-rotted manure. Dig the manure in and around the roots near their ends and not near the trunk of the tree. Mix the manure with the soil.

Q. When shall I prune my privet hedge?

J. B., *Brooklyn, New York.*

A. Almost any time. This is as good a month as any.

Q. Which of the oaks do you prefer for city street planting? F. McK., *Philadelphia.*

A. The red oak for the heart of the city and the pin oak for suburban districts.

NORTH CAROLINA'S FOREST FIRES

LAST spring was the most disastrous to the forests of North Carolina from fire of any so far recorded. From an incomplete canvass made by the State Forester, reports were received of the burning over of more than three-quarters of a million acres of forest land and a loss of over \$4,000,000 in property from forest fires. Eight counties in eastern, and one in western North Carolina, reported damages exceeding \$100,000 each, while sixteen others lost more than \$20,000 each; two counties reported damages of a million dollars or more. It is noteworthy that less than half a million dollars' damage was reported from the western half of the State, while more than three and a half million dollars was reported from the eastern counties. This is especially interesting in view of the fact that the fire protective measures that were taken were confined to the western counties, as the money came from the Federal Government under a provision of the Weeks Law which allows the spending of a limited amount for the protection of the headwaters of streams, provided coöperation can be secured from the State and the landowners.

The new State law in regard to forest fires is one of the best now operative in any of the Southern States. Unfortunately, the appropriation for enforcing it was not granted, so that the Federal Government has to be depended upon for what little protection it is possible to undertake. It is confidently expected that the next Legislature will make an adequate appropriation for this important work. This will not take the place of what the Federal Government is now doing, but, on the other hand, will enable the State to ask and obtain a very much larger Federal apportionment than it is now possible for it to receive.

NEW WAYS OF MAKING PAPER

THAT satisfactory wood pulp can be made from a number of heretofore little known woods is evidenced by a recent Government publication, which contains seventy samples of paper manufactured by different processes, chiefly from woods heretofore practically unused for this purpose.

It is pointed out that the spruce forests of the country are threatened with exhaustion and that the cost of spruce pulpwood has steadily increased. If the price of newsprint paper is to be kept at a reasonable figure, say the experts, more efficient methods of converting spruce into pulp must be developed or cheaper woods substituted for it.

The bulletin goes on to say that the method of manufacturing groundwood pulp has changed very little since its introduction into this country in 1867. It was with the idea of developing new methods and improving the old that tests were undertaken at the Forest Service laboratories at Wausau and Madison, Wisconsin. As a result, the relation of the different steps in the manufacturing process to each other has been definitely established and the merits of each treatment determined. The paper made from new woods was given a practical tryout by two large newspapers with satisfactory results.

The tests showed that eleven new woods give promise of being suitable for the production of newsprint paper, while a number of others will produce manila paper and boxboards. Most of these woods are confined to the West, while the groundwood industry now obtains the bulk of its raw material from the East. It is thought that pulp-making plants must eventually move to points where they can obtain a plentiful supply of wood and an abundance of cheap water-power, two prime requisites in the business.

Wood Preserving Department

By E. A. STERLING.

IN this department last month the reasons for the decay of timber were discussed. Since it is a well-established fact that wood-destroying fungi cause decay of timber, the next point is to determine what can be done to prevent this destructive action.

The first essential of a good wood preservative is that it shall kill the fungous growth which causes decay or make it impossible for the spores to develop. This toxic quality is possessed by many chemicals or compounds, but for practical purposes only a few possess the additional requirements that they shall remain liquid at ordinary temperatures, penetrate at least the outside tissues of the wood, be permanent enough to give continuous protection, and be safe to handle and apply. There is the further economic requirement that the preservative shall be of reasonable cost.

Many hundred preservative materials have been tried and abandoned because they were too expensive, or failed to meet one or more of the essential requirements. Long experience clearly indicates that coal-tar creosote is the best general preservative. It comes the nearest to meeting all the essentials and approaches the ideal because it prevents decay, is lasting in its results and is not too expensive for general use. It fails to reach perfection because there is some loss by evaporation, but mostly of the lighter, less valuable fractions, and it does not penetrate the dense, hardwood portions of some timbers. On the other hand, it is insoluble in water, remains liquid at ordinary temperature and is safely used under nearly all conditions. It has a strong pungent odor, but this disappears almost entirely after exposure to the air. Creosoted surfaces cannot be painted in light colors because the oils stain through, but the creosote itself gives a rich brown tone.

ANOTHER preservative which is extensively and successfully used is a mineral salt known as zinc chloride. This also is sufficiently toxic to kill wood fungi, penetrates the wood when in solution, and very materially increases the resistance of wood to decay. It is cheaper than creosote and would be universally used except for the fact that it cannot be successfully used by open-tank or brush treatment, and is not as effective as creosote when applied superficially. It is also soluble in water, which causes it to leach out to some extent from the outer portion of the wood.

Among many other materials which have been used as wood preservatives, but which have not received recognition, are tar, crude oil, linseed oil, whitewash and wood creosote. With the exception of the latter, it may be safely stated that they are not sufficiently poisonous, do not penetrate the wood sufficiently, are not permanent, or are too expensive for general use. Wood creosote has

qualities which indicate a preservative value, but the results from its use are not fully established, nor is it generally recognized as a satisfactory preservative for the small consumer.

IN the case of patented or proprietary preservatives careful consideration should be given to their value in relation to cost. These include chemical solutions of various kinds, many of which have been quite extensively sold. Some of them, particularly those containing creosote, have high preservative value; others are practically worthless, despite extravagant claims. Most of them are high in cost and are rarely superior to refined or even crude creosote and often not as good. As a guide in considering the value of the many preservative preparations offered in retail quantities it should be remembered that there have not been any new preservatives of established value discovered or developed for many years. Trade name may be used for material of great value, but if this is the case, it should be ascertained whether or not the principal constituent is an accepted material, such as creosote. While recognizing fully the effectiveness of zinc chloride for commercial use, if applied by proper pressure process, the fact remains that for the small consumer, using the open-tank or brush treatment, or for the man who buys the preservative by the barrel for home use, the safest and most reasonable course is to buy the best creosote obtainable. This may mean buying it as creosote or under some trade name, but the result is the same, provided the oil is derived wholly from coal tar.

THE many kinds and forms of timber which it is desirable or economical to give a preservative treatment is a large subject itself. While it has been mainly the large consumers, such as railroads, which have recognized and adopted wood preserving methods, on the farm or around the average home, the advantages are equally apparent. The economy, permanence and attractiveness of many structures would be very greatly increased at a distinct saving as a result of proper treatment. Among the many classes of timber which can be advantageously treated may be mentioned fence posts, sills and foundation timbers, board-walks, wooden gates, pickets, wind mill frames, silo staves, shingles, floors of stalls, sill joists and framing under floors and timber in contact with foundation or with the ground.

ANEW idea is to paint farm buildings and similar structures with creosote. It can be easily applied, is absorbed by the wood and becomes permanent and serves both as a paint and a preservative. The same idea may be applied to garages and similar small structures around city and suburban homes.

Editorial

CANADIAN FOREST PROTECTION

PROTESTS from many different sources, following the frightful forest fires which destroyed hundreds of lives and millions in property, have been pouring in on the Minister of Lands, Forests and Mines of Ontario, Canada, about the present system of fire-protection of the forests. Boards of Trade of many cities and towns in the Province, deeply stirred by the fire losses, have sent recommendations urging a complete reorganization of the protection system. The most important recommendation is that a system of permits be arranged like those in vogue in British Columbia and Quebec. These require that before a settler can burn his "slash," *i. e.*, the trees and brush which he has cut down in order to clear his land, he must obtain a written permit from the fire-ranger in his district, so that the fire-ranger may be there to see that the brush is properly piled, that it is not too near the forest or houses and that the weather conditions are favorable. It works no hardship on the settler, in fact it is of material assistance to him, because the ranger is an expert, and will help him to burn his slash in the easiest way and to put out the fire if, by any accident, it assumes dangerous proportions.

The Ontario Government has nothing against the system itself, but fears that it will antagonize the settlers and thus lose votes. Experience has proved that this is not the case, as, wherever the system has been inaugurated, the settlers would not go back to the old way where any careless man could endanger the lives and property of all his neighbors. It is certainly to be hoped that the Minister will show a progressive spirit and that he will realize that the good of the Province and the protection of its lives and property are far more important matters than any political considerations.

In this connection it is necessary to protest against the haphazard placing of settlers on any and every kind of land, regardless of whether it is fit for cultivation or not. In the "clay belt" of Ontario, while the soil is admittedly agricultural, it is so difficult to bring under

cultivation that the ordinary method of selling lands to settlers, just wherever they choose to locate, is a bad one. Settlers have been allowed to take up lands in a very scattered fashion, so that there are now large numbers of isolated farms. This makes it difficult and expensive for the government to open up roads and makes it practically certain, as was shown by the recent terrible forest fires, that, in case of a general conflagration, the settler will likely lose his life and certainly all his property. The proper and common-sense way would be to open up a certain section, build proper roads, lay out lots with some reference to the topography of the country, set aside forest reserves, which would serve to supply building timber, fencing and fire-wood, and compel the settlement of the whole area so prepared before allowing any settlement elsewhere.

In Quebec there is, in spite of the excellent system and the fire-protection associations, still much work to be done. In the districts outside of those patrolled by the coöperative associations there have been some very serious fires, particularly near Escalana on the National Transcontinental Railroad, where a fire sixty miles long was burning recently and, had it not been stopped providentially by rain, would have made it very difficult for the Saint Maurice Forest Protective Association to have prevented its entering their territory. The same was true of a large fire in the neighborhood of Saint Felicien on Lake Saint John, where the Association was compelled to maintain a large force of men to prevent the fire entering its property. The whole valley of the Saguenay River, famed for its scenic beauties, was burnt, and the smoke was so thick that navigation was impossible for several days. The Minister of Lands and Forests of Quebec, the Honorable Jules Allard, realizing these grave dangers, is at present engaged in an effort to correct them. His untiring efforts to get a better system of fire prevention and his marked success are in eloquent contrast with the actions of the Ontario officials.

THE WHITE PINE BLISTER RUST

THE blister rust, which is capable of rendering the growing of white pine throughout this country commercially impractical, did not come to our shores unheralded. As early as 1908 Dr. C. Alvin Schenck, forester for the Biltmore estate, warned certain foresters against importing white pine nursery stock from Germany, protesting that this disease would surely be introduced and would ravage the native forests. At that time there was no federal law or board controlling the

importation of nursery stock, and the introduction of the chestnut bark disease from China went undiscovered until the chestnut trees began to die near the source of infection, New York City, with results known to all. This species is doomed, for there is no method of combating the disease.

Importations of white pine continued, in spite of this warning, which was not generally understood, until the Superintendent of Forests of New York, C. R. Pettis, dis-

covered the disease in the State plantations and in stock imported from the Heins and Sons nurseries, Germany. A conference of state foresters was called at once. Plantations were inspected, diseased trees eradicated and it was hoped that the danger had been averted. Further importations of pine were prohibited and control established by federal authority over the bringing in of all kinds of foreign nursery stock.

But the planting of imported pines purchased and distributed by commercial nurseries dealing in ornamental stock, for small forest and other plantations, had been quite extensive, and the efforts made by these state foresters failed to detect all the infected trees, largely for lack of specific funds with which to carry out the work with complete thoroughness. Appropriations depend on public interest, and the public were asleep and could not be aroused.

Suddenly, this season, alarming discoveries were made, in several localities, of diseased pines. Under the leadership of H. A. Reynolds, Secretary of the Massachusetts Forestry Association, a congressional appropriation was secured to scout for the detection of the disease in pines and on currants and gooseberries. The results to date reveal a wide-spread infection of the latter, covering large areas and every New England State, and even in Minnesota and Wisconsin, where it has been imported from sales through commercial nurseries.

Unlike the chestnut bark disease, the blister rust cannot

spread from pine to pine, but finds a secondary host in the currant and gooseberry. By eliminating these species in the neighborhood of infected pines, as well as by completely eradicating the diseased trees themselves, there is still hope of saving the white pine.

But if the initial error of half-way measures is repeated, whatever effort is now put forth will be wasted. An interstate committee has been formed to take charge of the work, and after carefully canvassing the possibilities, has decided that the effort should be made. The work calls for state and national appropriations—for lack of which, at first, the disease escaped in the face of the inadequate efforts put forth to stop it. It calls for expert services, for the layman may not always recognize the trouble. It is a most potent example of the wisdom of intelligent technical control and direction of our state forestry departments,—for the state foresters have acted promptly and efficiently. There is still a tendency in certain quarters to discourage the efforts at eradication by either minimizing its importance, or, worse still, by throwing up the sponge and declaring that it is all over and nothing can be done to stop the scourge,—and this in the face of the fact that the disease is but fairly started. Such sentiments are distinctly inimical to the public welfare and deserve the most severe condemnation.

Let us unite in a determined effort to suppress the plague and save the white pine, noblest of all our forest monarchs.

THE FARM WOODLOT

IN a recent article, Mr. G. P. Wharton has shown that in the six New England States thirty per cent of the entire region is embraced in woodlots owned by farmers, a total of 11,500,000 acres, fully one-third of which is covered with worthless scrub, while of the remainder hardly 2 per cent is intelligently managed to produce trees. Yet this area is practically all absolute forest soil by reason of its steepness and rocky character. Much of it was once cleared for pasture, and is now reverting to forest.

The total per cent of land devoted to woodlots in other states varies, being lowest in fertile plains, or in regions not adapted to trees, and highest, as distinguished from large forest areas, in unsettled regions with much poor soil and rough topography, but will always total a very substantial percentage of the forest area, and amounts to about 7 per cent of the wooded area of the entire country.

A thrifty woodlot producing its maximum growth of timber adds enormously to the value of the farm, by supplying fuel and other material, by giving employment to labor and teams in winter, by protecting the home and crops from wind, and by increasing the desirability and marketability of the property. Farmers can afford to hold woodlot property permanently, carrying it as part of the farm unit and growing timber crops in spite of

taxes and times when, under similar conditions, owners of forest lands not attached to farms find it unprofitable to do so, and sell or abandon the land after denuding it.

But the widespread neglect and abuse of woodlot property bids fair to put an end to the woodlot as an economic factor in farm management. Unless farmers are educated to the real value and possibilities of their woodland, this vast area will continue to retrograde as in the past.

Much can be accomplished by states through the establishment of demonstration areas. But to reach the individual, we must have men educated to the problem. *Courses in farm forestry should be made a compulsory part of the curriculum of every state agricultural college receiving government aid.* Men with at least this much education in forestry should be chosen as county agents under the Smith-Lever Law. Special state agents, experts in woodlot forestry, should be appointed under this same law in every important woodlot state.

In spite of all past efforts, the amount of absolute ignorance and indifference among woodlot owners as to the proper care of their property is nothing short of appalling, and the sooner this problem receives the recognition which it deserves, the better it will be for the great body of farmers on whose shoulders the responsibility rests for ownership and management of a very substantial portion of our future timber supply.

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Abitibbi Paper Mills Not Burned

Newspaper reports of the great forest fires in Ontario, Canada, some of which were quoted in the August issue of *AMERICAN FORESTRY*, declared that at Iroquois Falls the great paper mills of the Abitibbi Power and Paper Company were destroyed. It is gratifying to announce upon information from the officers of the Company that the mills were not destroyed nor injured in the least, that only a few buildings were burned, and that there was no loss of life at Iroquois Falls. The statement is also made that the mills are not owned, as the newspapers said, by *Chicago Tribune* capital.

Book Reviews

Farm Forestry by John Arden Ferguson, A.M., M.F., Professor of Forestry, at the Pennsylvania State College. 249 pages. Price, \$1.25. John Wiley & Sons, Inc., New York.

This book covers the subject of forestry as applied to the farm woodlot, and is especially intended for text-book use in agricultural colleges and high schools. It is the outgrowth of lectures delivered to agricultural students throughout several years. The author's aim has been to treat the subject from the broad standpoint of the woodlots in the great plains and prairie regions as well as in more eastern regions. With a teaching experience both in the central west (he was formerly Professor of Forestry at the University of Missouri), and in the east, he is in a position to appreciate the varying requirements in the different sections of the country. The subjects included are those of essential interest to the agriculturalist. The establishment of the woodlot, both by seeding or planting and by natural methods, is discussed with hints as to the best trees to plant in different sections. The care and protection of the woodlot is treated and also the very important subject of woodlot management. A conception of the woodlot as forest capital is given with suggestions as to the amount of wood to remove annually and the methods of securing a sustained annual yield. Chapters are also devoted to the harvesting and marketing of woodlot products and to wood preservation. In the appendix, there is included a suggested list of practical exercises for a course in farm forestry.

The Woodcraft Girls at Camp. By Lillian Elizabeth Roy. Price \$1.25, George H. Doran Company, New York.

This is the story of the frolics and tribulations of an actual outdoor camp of Woodcraft Girls, the formation of the band, their ceremonies, life and sport on a wood-

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Mrs. Roy is well known as a writer of books for young people. She has told a jolly, rollicking story of more than ordinary value because of its complete and detailed description of the Woodcraft customs and instructions as to membership, etc.

Canadian Department

BY ELLWOOD WILSON

Secretary, Canadian Society of
Forest Engineers

During the forest fire at Abitibbi, we are informed that the wood piled up for winter use by the Abitibbi Pulp and Paper Company was burnt and that they will have to at once commence to cut a fresh supply. During the fire all the people in the neighborhood were compelled to take shelter in the mill, a large, concrete-steel building, which fortunately lay in a little depression of the ground and gave protection from the fire and smoke.

Dean Adams, of the Faculty of Applied Science of McGill University, Montreal, has been visiting Grand'mère, to look over the plantations, nurseries and experimental forestry work of the Laurentide Company, Limited. Mr. Adams is a member of the Dominion Conservation Commission and has written a good deal on conservation in general.

Price Bros. & Company, Ltd., have secured funds for additions to their mills. The new newsprint mill will be ready in February of next year with a capacity of 62,000 tons per annum and the pulp production will be increased to 55,000 tons per annum.

The St. Maurice Lumber Company, of Three Rivers, P. Q., have just finished constructing fifteen miles of telephone line connecting up their headquarters camp with their river driving depots.

Nine fires, which either partially or wholly destroyed woodworking plants, were reported during the past month.

Sealed tenders were asked for by the Minister of Lands for British Columbia during July for the purchase of License No. 90, to cut 7,130,000 feet of Douglas fir, hemlock, cedar, white pine and balsam and 535 cords of shingle bolts. Three years will be allowed for the removal of the timber.

Messrs. D. A. Macdonald and G. R. Melrose have been elected associate members of

the Canadian Society of Forest Engineers. Both these gentlemen are members of the Dominion Forest Service, stationed at Calgary, Alta.

Ellwood Wilson, Jr., who studied forestry and engineering at Cornell and McGill Universities, has enlisted with the 242nd Forestry Battalion, C. E. F., and has been given a commission as lieutenant. From the Laurentide Company, Limited, Sergeant Lendrum and Corporal Roberts have also joined this battalion. Under Colonel J. B. White, this battalion is rapidly getting up to strength and is getting some splendid recruits, many of them coming all the way from British Columbia. They are quartered in the Guy Street barracks in Montreal and daily drills are whipping the men into shape. This is an excellent opportunity for forestry students who want a year or two of practical experience, as this battalion is recruited to do forestry and lumbering work, under military discipline and direction, in both England and France. Letters received from men who went over with the first Forestry Battalion are most enthusiastic.

Doctor Fernow, Mr. Clyde Leavitt, and Mr. S. L. de Carteret have been at the meeting of the Eastern Foresters' Society and the Society for the Protection of the New Hampshire Forests at Crawford Notch, New Hampshire.

H. R. MacMillan, Chief Forester of British Columbia, has recently returned from his trip to England, South and East Africa, India, Australia and New Zealand, and expects to leave shortly for China and Japan. He was sent out by his Government to investigate trade openings in connection with the lumber industry and his advance report is said to be most favorable and it is hoped that a big export business will be built up as a result of his trip. His conclusions are that there is a splendid opportunity for lumber, pulp and paper business in the countries visited.

All the paper mills in Canada are either enlarging their plants or planning to do so and it is pretty certain that, if the forests are properly protected, so as to give a permanent supply of raw material, that Canada will take the place of Scandinavia in supplying the world with pulp and paper.

It is reported that Buffalo interests will build a pulp mill "somewhere in Labrador." This looks like a foolhardy proposition, as it is difficult enough to erect and supply with raw material and labor a pulp mill in ordinary locations, but especially so to build it almost within the Arctic Circle, where access could be had for only a few months in the year and where the small and scanty spruce would have to be used.

Peeled pulp wood at Jacksonboro, on the Transcontinental in Ontario is selling, two feet long, for ten dollars a cord, f. o. b. cars, and is being shipped to Wisconsin, where it will cost delivered \$17 to \$18 per cord, as against \$12 to \$14. If the price continues to rise there will be big money in planting spruce on poor lands near railroad lines.

Mr. E. H. Finlayson, District Inspector for Alberta, reports a very busy summer.

Mr. G. C. Piché, Chief Forester of Quebec, has decided to postpone the opening of the Government Nursery and Forest Experiment Station until next spring. Six good students will enter the Quebec Forestry School as freshmen this fall.

The experience of the present season has proved conclusively that with very few exceptions, the Dominion chartered railways of Canada have faithfully observed the requirements relative to forest fire protection imposed upon them by the Board of Railway Commissioners. The proof of this lies in the fact that, notwithstanding the exceptionally dry season, practically no forest fires of any serious consequence have occurred which could be attributed to railway agencies. It is true that a good many fires have started, many of them resulting unavoidably from the operation of trains, but the records show that, in general, the railway employes have been prompt in discovering, reporting and extinguishing these fires before they had time to cause serious damage.

Especial care has been taken by the companies in keeping the fire-protective appliances of engines in good order, and a large amount of work has been done in disposing of inflammable debris on rights of way. Special patrols have been maintained in forest sections, supplemented on all lines by the observance of special instructions to all regular employes relative to the reporting and extinguishing of fires in the vicinity of the track.

Not only have the railways been remarkably efficient in handling their own fires, but they have extinguished or aided in extinguishing many fires that originated at a distance from the track, due to all sorts of outside agencies. They have coöperated, wherever possible, with governmental or private fire-protective agencies, with beneficial results which, a few years ago, might have been thought impossible.

Reports indicate that, in many sections, settlers' clearing fires are the most serious source of fire danger. The experience of this year indicates the extreme importance of controlling this hazard, through the strict enforcement of existing legislation in Quebec, New Brunswick, Nova Scotia and British Columbia and the enactment and enforcement of similar legislation in Ontario.

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Forest Insects Destroy Millions Annually

Exact knowledge of conditions in your forest holdings is good preparedness against ruinous insect invasions. **Destructive Forest Insects** cause constant and serious yearly losses in forest capital that are avoidable. Small isolated patches or groups of dying trees may mean extensive insect killing if neglected. The economic control of forest insects prevents serious epidemics and reduces your forest fire risk. What per cent of your timber is killed each year? Find out. To know this is good business assurance on all forest holdings. Have your timber lands examined. Efficient inspection of Parks, Watersheds, Estates, and Timber Lands anywhere in the United States or Canada. Control methods recommended. Control costs estimated. Control work supervised, if desired.

BARTLE T. HARVEY
Consulting Forest Entomologist
MISSOULA, MONTANA

Forest Protection

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Our Trees

HOW TO KNOW THEM

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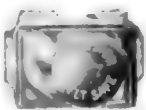
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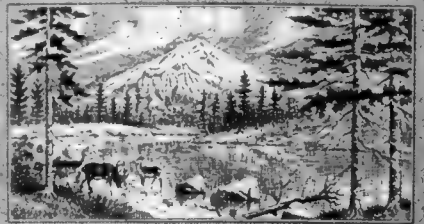
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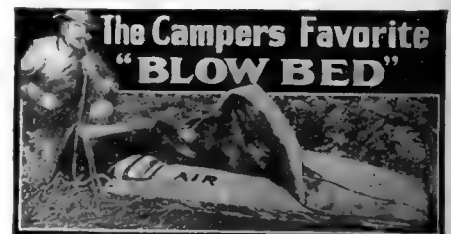
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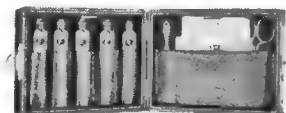
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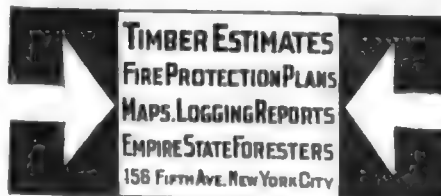
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- Farm Bulletin No. 5—Poultry House Construction.
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- Engineering Bulletin No. 2—Heavy Timber Mill Construction Buildings.
- Teachers' Cottages.
- Document No. 1.—Wood Construction in Relation to Fire Losses in Europe and America.
- Wood Construction vs. Substitutes.
- John Smith's Garage.
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American Forestry

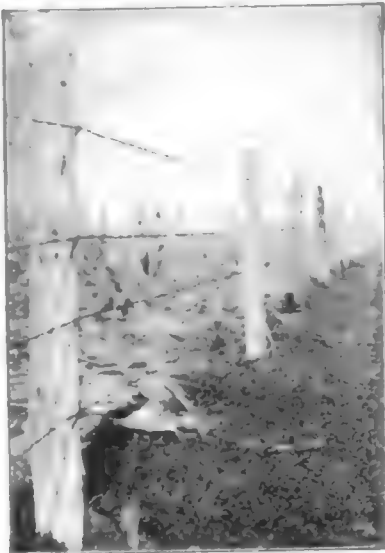
Vol. 22

NOVEMBER 1916

No. 27



THE RED GUM



These Ash posts were treated with Creosote in 1905, and when photographed in 1914 showed absolutely no decay. Experts believe they will last 15 to 20 years longer. Photos courtesy Iowa State College of Agriculture.

Proper Creosote Treatment to Increase the Life of Fence Posts

TWENTY-FIVE million fence posts, with a value of about \$4,000,000, are used annually by the farmers of but one of the agricultural states of this country, as reported in Bulletin No. 158 of the Iowa State College of Agriculture.

The value of creosoting these posts is indicated by the following table which shows the comparative life of treated and untreated fence posts of five species of wood commonly used.

Estimated Average Life In Years

Species of Wood	Untreated	Creosoted
Ash	6 years	25 years
Cottonwood	3 years	25 years
Red Oak	6 years	20 years
White Cedar	14 years	30 years
Willow	4 years	25 years



Untreated. These Cedar posts were set in 1905 and taken up for examination in October, 1914. In each case the sap-wood was entirely gone; in post No. 1 about one-third of the entire bottom rotted away; in post No. 2 one-half of the bottom decayed.

Further interesting facts are quoted from Bulletin mentioned above :

First—"By effective creosote treatment it is probable that woods commonly used for posts may be doubled in life (white cedar, oak, etc.)"

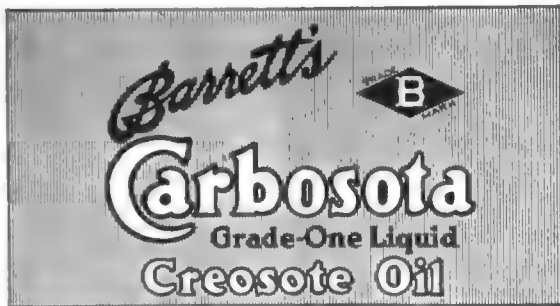
Second—"By treatment, many species, at present almost valueless, can be made to last twenty-five years or more, with only a small addition in cost for treatment (willow, soft maple, cottonwood, elm, etc.)"

Third—"Figuring the investment at 6% simple interest, creosote reduced the annual cost of the less durable fence posts by about one-half."

Fourth—"In selecting posts for treatment take the native soft-wooded trees and save the oak, hickory, black walnut, etc., for other purposes."

Fifth—"In creosoting select small posts, those 4½ inches in diameter, if of sufficient strength. They are cheaper, and when creosoted will last as long, or longer, than seven-inch posts."

Sixth—"See that the posts are thoroughly peeled of the inner as well as the outer bark."



Seventh—"The posts should be thoroughly seasoned before treatment is attempted, or a poor penetration of creosote oil will be secured."

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AMERICAN FORESTRY

The Magazine of the American Forestry Association

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A special request is made to members of the American Forestry Association to nominate for membership, friends whom they believe will be interested in the work of the Association and who would like to secure the magazine, American Forestry.

I Nominate for Membership:

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Signed Address

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He Was "Stuck" On His Tract

Once there was a man who had what was reputed to be an exceptionally valuable tract of timberland—no matter where—which he bought on an old-fashioned "timber cruise" plus his personal inspection.

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AMERICAN FORESTRY

Vol. XXII

NOVEMBER 1916

No. 275

The Red Gum

Identification and Characteristics

By SAMUEL B. DETWILER

RED gum is one of our most attractive ornamental trees, but it is equally distinguished for the exceptional beauty of its wood. It has many names. Sweet gum and Liquidambar are names that are applied on account of the fragrant resin which exudes from the bark. Star-leaf gum and red gum are given because of the shape and rich fall coloring of the leaves. Bilsted, alligator tree, satin walnut, Circassian walnut and hazelwood are other names occasionally bestowed upon it. Red gum is not closely related to the black gum and tupelos, but belongs to the Witch Hazel family. There are three related species, one being found in Mexico, one in central China, and the third in the Levant. The latter furnishes the liquid storax of commerce.

The home of the red gum is the region lying south of a line drawn from southern Connecticut through southeastern Missouri and northwestern Arkansas to the Trinity River, Texas. It is most abundant and reaches its greatest size in the lower Mississippi Valley and the lowlands of the southeastern coast. It is a tree that prefers rich moist soil and suffers no harm when the land is flooded for part of the year, but it does not

develop well in the permanent swamps where tupelo and cypress thrive. In the bottomlands it is usually found mixed with red maple, elm, ash, cottonwood and oaks. It grows on high land, but on dry soil the trees are of smaller size. The largest red gum trees are 5 feet in diameter and 150 feet high. Average-sized mature trees are 1½ feet to 3 feet across the stump and 80 to 120 feet high. In the forest the trunk is straight and clear of side branches far above the ground. Near the top it forks and forms a spreading crown. Young trees growing in the open have a long and very regular conical top. The bark on old

trunks is grayish brown, tinged with red; it is thick (1 to 1½ inches) and deeply furrowed into broad ridges which are covered with many small scales. Young trees have ashy gray trunks and frequently are covered with a hard, warty growth of bark from which the tree derives the name alligator wood.

The twigs are rather heavy and somewhat angular, and in the second year, peculiar blade-like ridges of cork appear on them, affording an easy means of recognizing this tree. The smaller branches of bur oak and cork elm have somewhat similar corky wings, but the bark between the corky ridges is not smooth and shining as is the case with the red gum twigs. The lustrous brown buds are about one-fourth inch long and are generally sharp-pointed. The alternately placed leaves are 5 to 7 inches long, and are usually cut into five points shaped like a six-pointed star with one point missing where the stem is attached. Occasionally the leaves have 7 instead of 5 points. They are bright green and glossy on the upper surface and somewhat paler beneath. When the leaves, twigs and buds are crushed, they have the same delightful fragrance as the resin which oozes from wounds in the bark of red gum trees growing in the South.

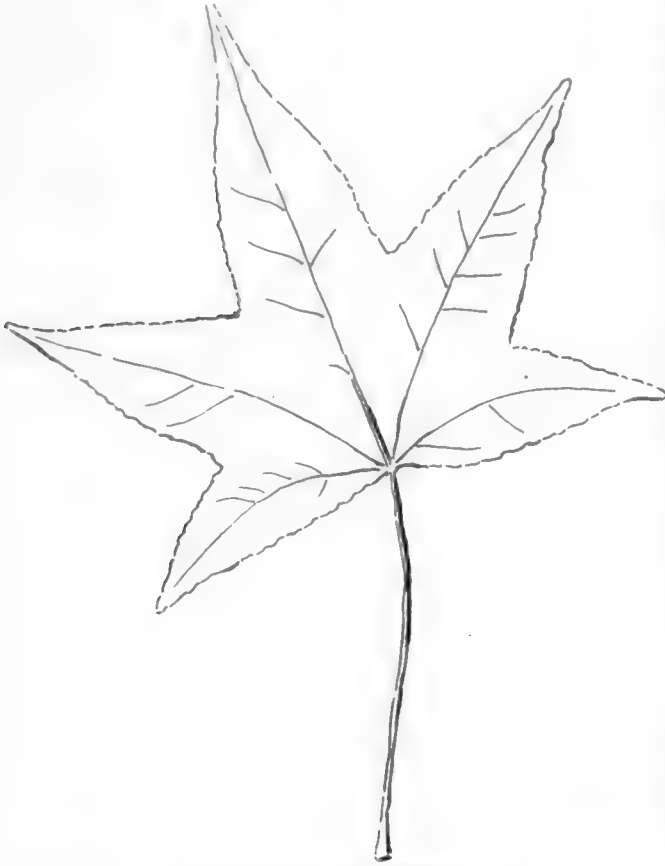
The flowers appear in March in the South and in April or May in the North, at the time the leaves are half grown. The greenish pollen-producing flowers are borne in dense clusters 2 or 3 inches long at the ends of the twigs. Each flower consists of a number of stamens clustered together and surrounded by small, hairy, leaf-like scales. The seed-producing flowers are greenish balls that hang singly on long threads at the bases of the upper leaves of the twigs. The seed balls are 1 to 1½ inches in diameter and ripen their seed in the fall but remain



AREA OF RED GUM TREE GROWTH

Red gum (*Liquidambar styraciflua*) is distributed from Fairfield County, Connecticut, to southeastern Missouri, through Arkansas and the Indian Territory to the valley of the Trinity River in Texas, and eastward to the Atlantic Coast. Its commercial range is restricted, however, to the moist lands of the lower Ohio and Mississippi basins and of the southeastern coast. While the red gum grows in various situations, it prefers the deep, rich soil of the hardwood bottoms, and there reaches its best development. It requires considerable soil moisture, though it does not grow in the wetter swamps, and does not thrive on dry pine land. Seedlings, however, are often found in large numbers on the edges of the upland and even on the sandy pine land, but they seldom live beyond the pole stage; when they do, they form small, scrubby trees that are of little value. Where the soil is dry the tree has a long taproot. In the swamps, where the roots can obtain water easily, the development of the taproot is poor, and it is only moderate on the glade bottomlands, where there is considerable moisture throughout the year, but no standing water in the summer months.

on the trees until spring, swaying on their long stems like the fruits of the sycamore; unlike the "button balls," however, the surface of the red gum fruit is roughened by numerous coarse spines. These fruits really consist of



LEAF OF THE RED GUM TREE

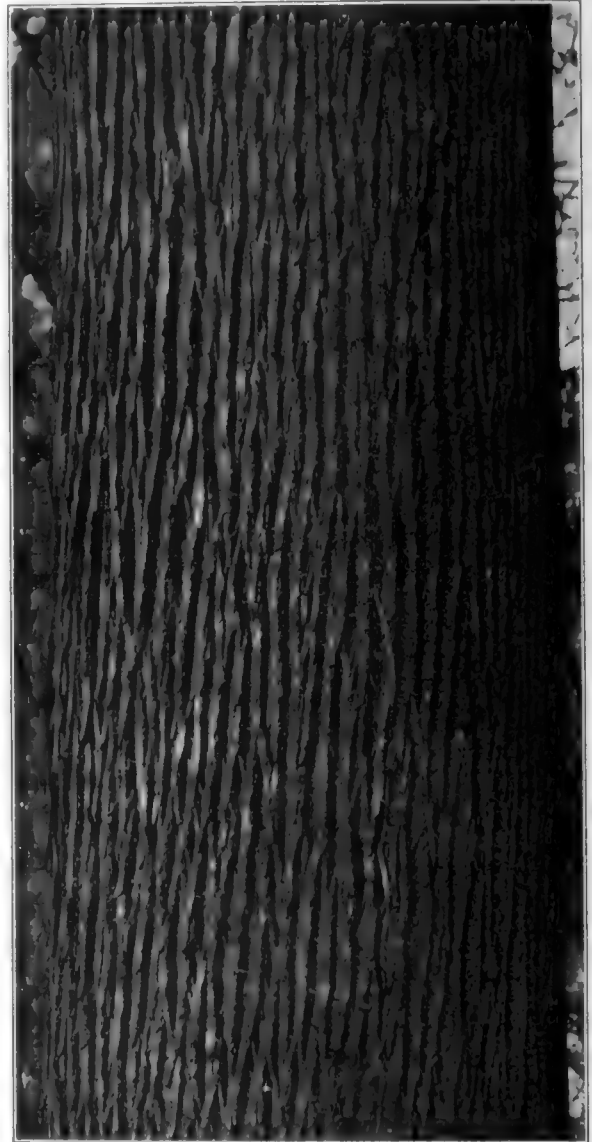
Red gum is easily recognized by its beautiful, glossy, star-shaped leaves. The star is lopsided because one point is missing where the leaf stem is attached. Usually there are five points to the leaf, but it may have seven. It is plain that "starleaved gum" is an appropriate name for this tree. If the leaves, buds or twigs are crushed, the agreeable aromatic odor produced explains why red gum is very frequently called "sweet gum." This name also refers to the resin which exudes from wounds in the bark, used for chewing-gum and perfume for glove leather. The name "red gum" may refer to the color of the heartwood, but it probably refers to the brilliant autumnal foliage. Some one has called it "a conflagration of color," to which only the coloring of the maples and the ashes can be compared.

a number of woody pods closely joined together, each pod having two curved, horn-like tips. In the fall the pods split apart, permitting the few good seeds they contain to fall to the ground along with a large number of undeveloped seeds which have the appearance of sawdust.

Red gum begins to produce seed when it is 25 or 30 years old and bears heavy crops at intervals of about 3 years until it is 150 years old, when its powers of seeding begin to decrease. Only 50 to 75 per cent of the seeds germinate, and in the native forest the greater number of seeds are destroyed by the long-continued floods to which the land on which much of the gum grows is subjected. The young seedlings require abundant light, and for this reason they are seldom found growing in dense forest under the old trees. The best natural reproduction of red gum is found in old pastures and clearings where the young trees have full sunlight. On cut-over lands stumps of red gum trees under 50 years of age produce a vigorous growth of sprouts. The sprouts grow much faster than the seedlings during

the first few years but seldom form large timber trees.

The red gum has no serious enemies. It grows principally on lands which are often overflowed and for this reason damage from forest fires is comparatively small. In bottoms and on the uplands it produces a taproot, and the strength of its root system prevents much loss from windfall. Insects and fungi attack felled trees and those which have been injured by fire or wind, but occasion no great commercial loss. Cattle refuse to browse on the seedlings because of the pungent flavor of the leaves, but hogs and goats are less discriminating and sometimes



DEEPLY FURROWED BARK OF RED GUM TRUNK

In the best situations red gum reaches a height of 150 feet and a diameter of 5 feet. These dimensions, however, are unusual. The stem is straight and cylindrical, with dark, deeply furrowed bark, and branches often winged with corky ridges. In youth, while growing vigorously under normal conditions, it assumes a long, regular, conical crown, much resembling the form of a conifer. After the tree has attained its height growth, however, the crown becomes rounded, spreading, and rather ovate in shape. When growing in the forest the tree prunes itself readily at an early period, and forms a good length of clear stem, but it branches strongly after making most of its height growth. The mature trunk is usually forked, and the place where the forking commences determines the number of logs in the tree, or its merchantable length, by preventing cutting to a small diameter in the top. On large trees the stem is often not less than 18 inches in diameter where the branching begins. The over-mature tree is usually broken and dry-topped, with a very spreading crown, in consequence of new branches being sent out. Injury to the butts of trees from fire and to the tops from wind or ice often opens the way to attacks from fungi, which cause decay, and from insects, which precede and assist the fungi.



TUPELO GUM SLOUGH, CONGAREE RIVER,
SOUTH CAROLINA

Tupelo gum, found in more or less large quantities throughout the range of the red gum and cypress, is cut to some extent from Virginia to the Gulf and westward to Arkansas. Its best growth, however, is in the Gulf States, and as a commercial timber tree it has reached great importance only in the region about Mobile, Alabama, and in southern and central Louisiana, where it is cut with cypress. In the handling of cypress and the associated tupelo several methods are in use, each adapted to some particular locality. If the land is not too swampy and has a firm foundation, a logging railroad can be maintained and steam skidders used to snake the logs with cables to the road and to load them with bull hooks on the cars. Where the land is so low as to be subject to practically continuous overflow the pullboat is generally used, and the logs are transported to the mill by towboats.

to lumber the red gum forests in such a way that the red gum trees are preserved or occasional seed trees left to reseed lands where close cutting is practised. Because of the expense of logging, including high freight rates and increased costs of labor and supplies, lumbermen who cut red gum operate on a very limited margin of profit. The result has been wasteful logging and destruction of much young growth. One operator recently stated that under present conditions only 22 per cent of the standing gum timber in Arkansas, Louisiana and Mississippi could be manufactured profit-

destroy much young growth. Hogs are especially destructive because they eat the seeds.

Present conditions do not warrant the planting of red gum for the production of lumber on a commercial basis. The supply of standing red gum is large and stumpage prices are low. Instead of planting it will be much more profitable, and, therefore, better forestry practice,

ably. Considerable merchantable lumber is wasted in the woods in high stumps, top logs and trees which are damaged but too small to carry to the saw mill, that would be saved if prices warranted more careful logging. Although it is not reasonable to expect lumbermen to expend money in conservative logging where the financial returns do not justify it, experience with other species,



A LARGE RED GUM, RICHLAND COUNTY,
SOUTH CAROLINA

Red gum is perhaps the commonest timber tree in the hardwood bottoms and drier swamps of the South. It is found also to a considerable extent on the low ridges and slopes of the southern Appalachians, but there it does not reach merchantable value and is of little importance. The hardwood bottoms are for the greater part overflow land. The soil is alluvial and generally of great fertility, and tree growth is for the most part extremely rapid. These hardwood bottoms stretch along nearly all of the Southern rivers on the coastal plain and in the Mississippi Valley States. They are subject to heavy floods in the winter and spring, for the rivers, rising among the mountains, run swiftly until they reach the general plain level, so that any increase in the volume of water is bound to overflow the banks and spread out over the entire width of the bordering swamp, often to a considerable depth. These bottomlands vary considerably in width, but are usually from 6 to 12 miles wide, and are bounded by the sharp banks of the upland plain, the river meandering through the swamp from one bank to the other.



SECOND-GROWTH RED GUM, ASH, COTTONWOOD, AND SYCAMORE, ON
HARDWOOD BOTTOMLAND, SOUTH CAROLINA

Red gum grows in mixture with ash, cottonwood, and oak throughout the hardwood bottomlands of the South. These rich, alluvial bottoms are among the best natural farming lands of the region. In the past the gum, having no marketable value, has been left standing after logging, or, where the land has been cleared for farming, has been girdled and allowed to rot, and then felled and burned as trash. Not only were the trees a total loss to the farmer, but from their size and the labor required to handle them, they were so serious an obstruction as often to preclude the clearing of valuable land. In the sloughs and perpetual swamps are large quantities of cypress and tupelo gum, and there is some black gum on the ridges. The forest is, for the most part, dense and fairly even-aged. There is little young growth beneath the older trees. Canebrakes are common and are very dense, the cane often reaching a height of 20 feet. This cane, with the briars and rattans, makes a very heavy undergrowth, so that where it occurs no tree reproduction can take place. The result is that the forest gradually becomes rather open in character.

such as white pine, birch or hard maple would indicate that lumbermen will be repaid for giving greater consideration to the second growth of red gum.

The red gum is a superb tree for ornamental planting, ranking with the most beautiful of our Eastern broad-leaf trees. It appears to hold a higher place in Europe as an ornamental tree than it does in America, but this is probably due to its wide natural distribution here. It is hardy as far north as Massachusetts, is easily handled, and grows fairly rapidly. In the South Carolina forests its average growth is 100 feet in height and

15 inches in diameter in 50 years, and height growth is rapid in the early years of its life. The tree is interesting throughout the year. In the summer the large, glossy, star-shaped leaves are unusually attractive. The fall coloring of the foliage is unsurpassed by any other species in the brilliancy of its crimson. Its gorgeous scarlet, red, orange and yellow tints vie with those of the maples. Later the leaves may assume the purple, lilac, brown and bronze tones of the ashes. The red gum gives an excellent winter effect because of its symmetrical form, its sturdy branches with their conspicuous gray, corky ridges and the peculiar spiny fruit balls that hang in abundance from the twigs. This tree should be planted in rich moist soil and should be closely pruned when it is transplanted. It has ability to withstand salt air and

is valuable for seaside planting if soil conditions are good.

The wood is heavy and hard, close-grained and without great strength. The heartwood is a beautiful, bright reddish brown with a satiny luster and frequently with a pleasing, varying figure. The sapwood is nearly white and is usually wide, the smaller sized trees consisting entirely of sapwood. Twenty years ago red gum wood was considered to be of little value because of its tendency to warp, but with improved methods of drying it is now one of our finest furniture and finishing woods. Few woods in America equal it in the beauty of its natural grain and it can be finished to imitate oak, mahogany, cherry, or Circassian walnut. For this reason it has been predicted that red gum will in time equal white oak in value.

Commercial Uses of Red Gum

THE beauty, adaptability and fine working qualities of red gum lumber have promoted it with phenomenal rapidity from a despised species to one of the most respected and prominent cabinet woods. For many years this wood was cut to a limited extent; preference was given to woods easier to handle, because red gum lumber warped and twisted in the process of seasoning. No trouble was experienced with red gum after it was seasoned, and decreasing timber supply finally led to practical experiments in the better utilization of this wood. Technical investigations of the structure of the wood and of the principles of kiln-drying finally overcame the difficulties and a wide market for red gum lumber quickly developed, in spite of the prejudice against it. Occasionally it has masqueraded under assumed names, for it is a common failing of human judgment to believe that ordinary "gum" must be lacking in the superior qualities which the wood possesses when made into furniture of "satin walnut" or interior finish of "hazel wood."

The use of the word "gum" to designate several entirely different species of trees may be responsible for some of the prejudice against red gum. The Eucalypts are frequently called gums, although in no wise related to the true

gums. Black gum, water gum, cotton gum and tupelo are also wholly unrelated botanically to red gum, although they grow in many of the localities where red gum is native. These gums have a twisted grain with the fibers so tightly interlocked that the wood is split with exceeding difficulty. The wood is useful for heavy wheel hubs, rollers, mauls, construction and box material, flooring, and paper pulp. The characteristics of red gum are concisely expressed in Bulletin 58 of the U. S. Forest Service, as follows:

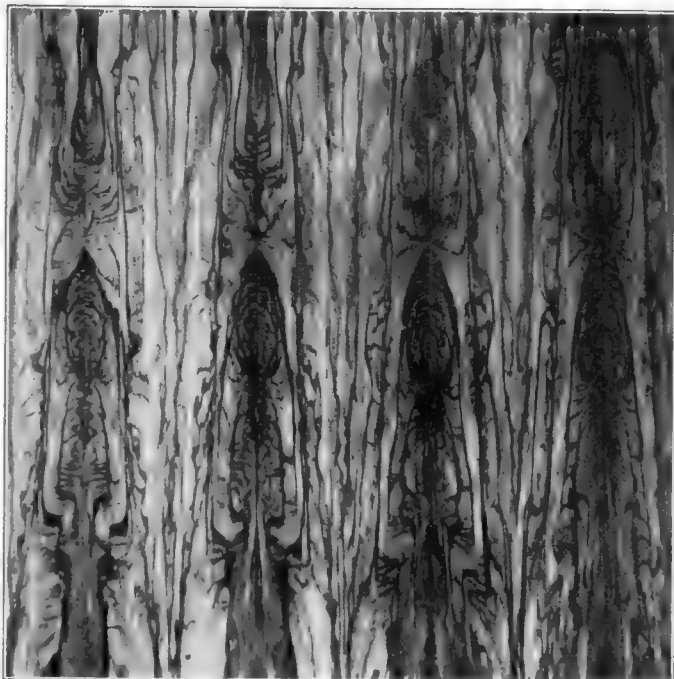
"The wood is about as strong and as stiff as chestnut, or a little weaker than shortleaf pine; it splits easily and is quite brash; it is less tough than cottonwood and splinters less; it is about as hard as yellow poplar and can be worked with tools almost as easily; it has a moderately fine grain, is denser than cottonwood, and has a large proportion of sapwood; the sapwood decays rapidly when exposed to the weather, but the heartwood is quite durable even in the ground. The green wood contains much water and consequently is heavy and difficult to float, but when dry it is as light as basswood, or about 15 per cent heavier than yellow poplar or cottonwood. The great amount of water in the green wood, particularly in the sap,



PEELED RED GUM LOGS SEASONING IN THE WOODS, SOUTH CAROLINA

A large amount of red gum growing in the South can be economically transported from the forests to the mills only by means of the streams, owing to the expense of putting in railroads solely for the timber. Green red gum, however, is so heavy that it scarcely floats. Probably one-third of the logs, those with the largest amount of sapwood, sink. The method of peeling the logs ready for the river, now principally followed in the South, is to cut the trees, without girdling, in the fall of the year, or from as early as the first of September until the time when high water comes, which is usually from the first of January to the first of February. At that season the sap is down and the wood is as light as it ever will be while the tree is standing. When felled, the tree is cut into standard lengths; the logs are then skidded to the bank of the river, and tied in rafts with cypress, ash, or cottonwood, to keep them from sinking, and floated down to the mill as soon as high water comes.

makes it difficult to season by ordinary methods without warping and twisting. This fault can be overcome, however, by special treatment. The color of the heartwood is a rich, reddish brown; that of the sapwood cream white. It is tasteless and odorless, and, when once seasoned swells and shrinks little unless exposed to the weather. Its structure is so uniform that it can be stained, painted, or glued without absorbing much of the material."



QUARTER-SAWED RED GUM VENEER

All red gum, whether figured wood or plain wood, quarter-sawed or plain sawed, has a rich, reddish-brown color, with a character as soft and delicate as the sheen of fine satin, and quarter-sawed figured red gum veneer offers possibilities for matching figure known to no other wood. It produces a great variety of markings and color tones, and selections of flitches may be made to meet the individual taste of the designer. It has equally the beauty of Circassian walnut and mahogany, yet has a distinctive character peculiar to no other wood.

Estimates based on statistics collected by the Bureau of Corporations place the total stand of this wood in the United States at about 50,000,000,000 feet, board measure. In amount it is equal to about one-fourth of all the oaks in the country; two and a half times the hickory; three times the ash; one-fifth more than cypress; nearly three times the maple; many times the elm; and, except the oaks, it exceeds in amount any other hardwood, or group of hardwoods in the United States. In fact, it is estimated that one-eighth of all the hardwood of this country is red gum. It is, therefore, apparent that it is a timber of great importance.

The annual output of red gum lumber has grown enormously. In 1900 only 285,000,000 feet of red gum lumber was cut in the United States or 0.8 per cent of the total annual lumber production. In 1913, there was cut 772,514,000 feet or 2 per cent of the total cut—an increase of 270 per cent in 13 years. To this must be added the red gum used in veneer, slack cooperage, railroad ties and miscellaneous articles, so that it is safe to estimate a cut more than a billion feet each year. In several states red gum ranks second to white oak in the amount of hardwoods used in manufactured articles.

Illinois uses more than 120,000,000 feet annually; Arkansas and Missouri each consumes about 100,000,000 feet, Kentucky and Tennessee more than 50,000,000 feet each. Boxes and crates use a large percentage of the cheaper grades of red gum. Some of the finer grades are manufactured into cigar boxes. In Pennsylvania alone more than a half million feet is consumed annually for this one purpose.

In this country a constantly increasing quantity of red



PLAIN-SAWED RED GUM, FIGURED WOOD

This shows a great variety of stripes and color tones, and is in demand for special cabinet work of all kinds. It is extensively used in the manufacture of high-grade furniture, built-in furniture, stairwork, car construction, etc., both in this country and foreign countries. It is often finished to imitate more costly woods, such as black walnut, cherry, mahogany and especially Circassian walnut, since lumber may be selected which has a natural figure closely resembling that of Circassian walnut. Red gum furniture finished "natural" does not show finger marks and is easily cared for.

gum is used in the manufacture of furniture. The commoner grades are made into drawers, frames, and backing, for desks, bedsteads, tables, etc. Considerable clear heart is used also for surface work, either solid or as veneer. The natural color of the wood is attractive, but it takes stain so well that it is often made to imitate mahogany, oak, walnut, etc. The furniture factories in the cities use annually between 40,000,000 and 60,000,000 board feet of this lumber. A sewing-machine company at Cairo, Illinois, uses 15,000,000 board feet of gum per year in the manufacture of sewing-machine tables. The wood is built up of three $\frac{3}{16}$ -inch pieces, laid crosswise to each other to prevent warping, and usually finished with oak or other hardwood veneer. This method has been found very satisfactory.

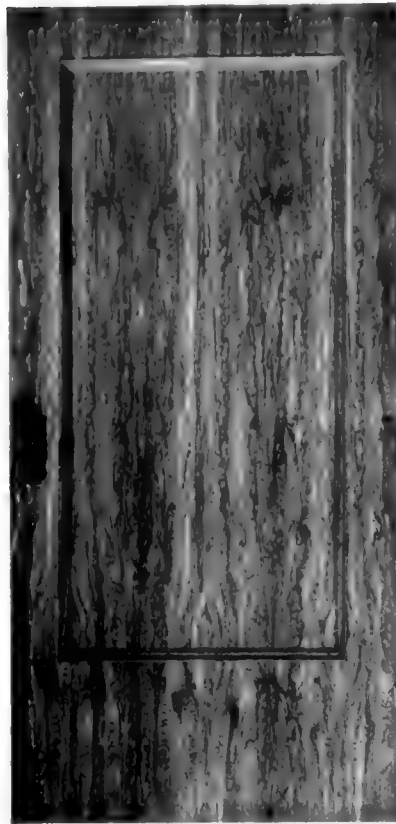
One of the most important uses of red gum is for interior finish. Stained or in its natural color, it may be made very attractive, and when properly seasoned fulfills every requirement of a first-class wood for that purpose. Red gum may be obtained in either plain or quarter-sawed lumber, or selected for figure. The figure in red gum is fundamentally different from the characteristic figures of oak and many other woods. Oak's figure in

quarter-sawed stock is due to the medullary rays with certain modifications by rings of annual growth. The figures of plain oak and chestnut, for example, are due almost wholly to the rings of growth. Gum's figure is due to neither. The shades and tones cross the rings in every direction, though they sometimes follow them with some regularity and medullary rays have practically no visible effect. It is hard to explain why some trees are figured and many are not, although it is quite certain that the figure in red gum is influenced by the soil and situation.

The red gum tree produces both sapwood and heartwood. Commercially the term "red gum" applies to the heartwood. Unselected gum or sap gum may be partially heartwood and partially sapwood, or all sapwood.

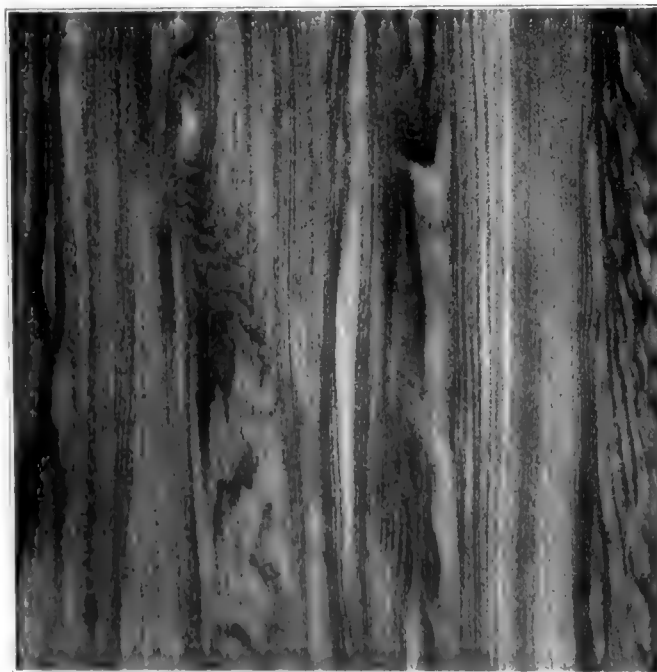
Practically 60 per cent of the stock coming from the tree is common or sap grade. This finds an almost exclusive use in the manufacture of boxes, for which it has been employed for the last six years, taking the place of cottonwood, pine, poplar, and sycamore, the latter used for tobacco boxes. The export trade of gum timber consists of clear heart, 6 inches wide and over, and of all thicknesses from three-eighths of an inch up to 2 inches. Practically 75 per cent of the clear-heart gum lumber cut in this country until recent years has been exported for use in England, France, and Germany for the manufacture of furniture and inside furnishings, newel posts, stair railings, etc. In England the wood is commonly called satin walnut. In 1912, over 66,000,000 board feet of red gum was exported to Europe.

One-third of the veneer manufactured from domestic woods, or four times the amount demanded of any other species, is made from red gum. It is better adapted than most other woods for cutting into thin sheets; it takes glue better than any other wood; therefore, it has the dis-



DOOR OF QUARTER-SAWED RED GUM, FIGURED WOOD MATCHED

Two of the most important uses of red gum are for doors and interior finish. Finished in its natural color, or stained, it may be made very attractive, and, when properly seasoned, it fulfills every requirement for these purposes. Red gum veneer-built doors are rigid and free from warp, and rank with the very best, both in appearance and stability. The effects that can be obtained by staining are varied and unusually attractive.



QUARTER-SAWED RED GUM, FIGURED WOOD

Some red gum trees produce what is termed "figured red gum." The colors ramify through the wood, obeying no known law of growth or deposit of earthy matter. It is in this that red gum's figure resembles that of Circassian walnut. The latter, however, has a feature generally absent from gum. It is a modification of the figure, due to the rings of yearly growth. The deposits of the pigment in the two woods appear to be much the same. Note the richness of stripes and color tones peculiar to this method of manufacture. It is used in the best type of furniture and in artistic architectural woodwork of all kinds.

tion of being the ideal veneer wood. It is manufactured into rotary-cut, sliced and sawed veneer, and is used for a wide variety of purposes—from light weight fruit packages to the best grades of the richest-colored and highly-figured panels used in furniture, pianos and the most expensive and artistic architectural wood-work of all kinds.

In 1912, over 30 million feet, board measure, of red gum was manufactured into baskets, and fruit and vegetable packages. For the manufacture of slack barrels red gum is now one of the most important woods in the country, ranking second to elm both as a stave and as a heading wood. For paving blocks the essentials are durability, close grain and the power of resisting abrasion. These are found in red gum. For treated blocks, unselected gum is used. The heartwood of the gum is used extensively in the South for fence posts, and, in a limited way, for sills. Where it is carefully selected and well seasoned, red gum is more lasting than red oak or shortleaf pine. Red gum has been used to some extent for railroad ties.

A large amount of red gum is put into wagon-box boards, which have a separate grade under the National Hardwood Lumber Association's rules.

All of the sapwood that will make wagon-box lumber is cut up for this purpose, because, when thoroughly dried and painted, sapwood is as good as heart. Unselected gum siding and ceiling contain no acid or other ingredients injurious to nails. It is close-grained, presenting a smooth surface for paint. It should be primed, however, as a precautionary measure as soon as it is in place. If used for siding, or in any place exposed to the weather, sapwood must be excluded or kept covered with paint. As flooring, red gum wears well, is free from splinters, and does not shrink if thoroughly kiln-dried before it is laid.

Various other articles are made of red gum, such

as coffin boards, barrels, packing boxes, screen doors, mouldings, saw handles, gun stocks, broom handles, mop handles, wheelbarrows, brush backs, mouse traps, all kinds of animal traps, agricultural implements, refrigerators and kitchen cabinets, musical instruments, picture frames, wooden ware, trunks, whips, canes and umbrella handles, tobacco pipes, clocks and toys. The spicy gum which exudes from the bark of the sweet gum and accounts for its name is of commercial value for use in chewing gum, and as a perfume for leather. It is also used medicinally under the name copalm balm, and has been used in incense.

The wood is steadily growing in favor, and at present dealers report orders for all manufactured material they can produce, in fact lack of cars has restricted deliveries until many mills are filled with orders awaiting shipment.

A "TEAR-DOWN" CAMPAIGN

TO test public-sentiment regarding obnoxious advertising posted on public highways, the Massachusetts Forestry Association recently declared a "Tear-Down Week," beginning October 9th. The members of the Association were asked to help individually. Automobile clubs, women's clubs, Boy Scouts, and the tree wardens were requested to assist. The newspapers all over the State fell in with the idea and commented favorably on the plan in their editorial columns, and tree wardens, whose duty it is to protect the trees from these signs, were vigorously reminded of their neglect of duty.

Massachusetts has two laws regarding this subject, one which declares all signs, not required by law, that are posted within the limits of the public highway, "a public nuisance, and may be forthwith removed or obliterated and abated by any person." The other refers to signs on trees within the public way.

Under these laws anyone in Massachusetts may remove any advertising sign within the public highway, except those that are required by law, and the Forestry Association's aim is to inform the people concerning these laws and to encourage the removal of all such signs. Reports are coming in from tree wardens and other individuals and groups stating that these signs, running into the hundreds in their respective communities, have been removed.

To those who knew the conditions before this campaign was started, the results are very gratifying. Thousands of miles of highways in the state are now free from signs and the Association proposes to carry this work further and offenders who persist in this illegal method of advertising will be prosecuted.



RED GUM FOR INTERIOR TRIM

Some red gum trees produce what is termed "figured red gum." The figure in red gum is fundamentally different from the characteristic figures of oak and many other woods. Oak's figure in quarter-sawed stock is due to the medullary rays with certain modifications by rings of annual growth. The figures of plain oak and chestnut, for example, are due almost wholly to the rings of growth. Gum's figure is due to neither. The shades and tones cross the rings in every direction, though they sometimes follow them with some regularity, and medullary rays, have practically no visible effect. The colors ramify through the wood, obeying no known law of growth or deposit of earthy matter.

FIRE DANGER SHIFTS TO EAST

ALTHOUGH final figures are not yet available, reports received by the Forest Service indicate that the forest fire season in the West and North is practically at an end. At the same time, say the officials, the fall fire season is just beginning on the National Forests in the Southern Appalachians.

The difference in the occurrence of the fire seasons is caused by the difference in the character of the forests and of the climate in the two regions. In the North and West the forests are composed almost entirely of conifers, and are located at comparatively high altitudes or high latitudes. The greatest fire danger in these regions occurs during the late spring and summer months, when the rainfall is light. During the rest of the year, there is, as a rule, enough rain and snow to prevent fires from starting. On some of the forests in southern California, however, the fall rains are sometimes late in coming and the fire-fighting organization must often remain on duty until late in November.

In the Southern Appalachians, however, the situation is practically reversed. The forest is largely composed of hardwoods and the heaviest rainfall occurs in the spring and summer and about two months in late winter. As a result, there are two distinct fire seasons. The first of these occurs in the fall, when there is usually little rain and the ground is covered with the dry fallen leaves, which are very inflammable. The fall fire season lasts until about December 15th, when the winter rains set in. In the later winter months, the woods dry out and in February or March the spring season begins, and continues until the spring rains come or the trees and plants put out new leaves and become too green to burn readily.

Trees In Medicine

By JOHN FOOTE, M.D.

Associate Professor of Materia Medica and Therapeutics, Georgetown University School of Medicine, Washington, D. C., Author of "Essentials of Materia Medica and Therapeutics"

THE idea that agencies of specific value in the alleviation and cure of disease are to be found in plants and herbs is one of the most deep-rooted, as well as one of the most ancient, of human beliefs. The remote folk-tales of archaic peoples embody this idea and relate its application by the hero, the magician or the priest. Even to-day we have our "herb doctors," and we do not need to go back much farther than a generation to recall the drug store, where large stores of "roots and herbs" were kept. There the apprentice was required to have sturdy shoulder-girdle muscles that he might turn the huge mill in which vegetable drugs were ground, or wield the pestle in the heavy iron mortar, where they were crushed, preparatory to being turned into decoctions, infusions, tinctures and other bulky preparations.

Nowadays we have more elegant, if less vigorous and copiously substantial, medicines prepared in the wholesale pharmaceutical laboratories. Gone is the drug mill, and it requires little muscle to serve soda water and perfumery. Gone, too, are many of the medicines from "roots and herbs" beloved of our fathers, but now shown to be valueless in the light of experimental pharmacology and our newer knowledge of pathology and bacteriology. For we have learned that medicines, except in a few instances, do not remove the cause of the disease, but may simply improve our natural resistance by aiding symptoms.

We have heard of "roots and herbs" in medicine, but, neither in ancient or modern pharmacy, nor in household medicine, do the products of trees as medicinal agents elicit much comment.

And yet, in spite of the pharmaceutical image breakers and the therapeutic

nihilists, some of the most valuable remedies used in medicine come from trees. And by trees is meant *trees*, not shrubs or bushes. One of the veritable Titans of the forest, a tree that has equaled the Big Trees of California in height, furnishes a much-used medicinal oil. And the one vegetable drug that is a specific for a certain disease, and cures by killing the blood parasite which causes malaria, was known to the older clinical teachers simply as "the bark," because it was the bark of a tree.

The place of trees and their products in medicine is far from being an incidental or an unimportant one, even in the most conservative works of the most advanced therapeutists.

And if, as has been asserted, the decadence of Rome was really due to malaria, and if her glory was obscured

by a cloud of mosquitoes rather than by the dust of battles, then it may be that the possession of some cinchona and the planting of the eucalyptus in the Roman marshes might have prevented a great civilization from withering and fluttering away and changed the countenance of history.

But now to discuss some of the trees from which drugs and medicines are obtained:

The tallest tree known, the *Eucalyptus amygdalina*, is one of the many species of eucalyptus found in Australia. It has been known to reach a height of 480 feet. Its brother, the *Eucalyptus globulus*, which is the popular medicinal variety better known as the blue gum tree, is itself no dwarf, since it attains a height of 375 feet. It grows very rapidly, in almost any climate with a mean temperature of about 60° F., but does not endure temperature below 27° F., and is cultivated in the south of



OLDEST TREE PRODUCT PRESCRIPTION IN THE WORLD

This papyrus, written, it is estimated, about the time that Moses was twenty-one years old, contains several prescriptions composed in whole or part of tree products. One is for the medicinal employment of the ricinus (degm) tree. The stems, it is declared, when infused in water make a lotion which cures headache; the berries chewed with beer relieve constipation; the berries crushed in oil make the hair grow, and pressed into a snail will cure an abscess in ten days, if applied every morning. The god Seb prescribes wine made from dates to cure wounds and skin diseases, and Isis supplies a formula containing juniper berries for pains in the head. The papyrus is in the British Museum.



THE TREE FROM WHICH QUININE IS OBTAINED

The cinchona tree in Ceylon, cultivated in rows of trees lining avenues. Note the white longitudinal marks on the trees where the workmen have removed the bark. This is in marked contrast to the destructive methods formerly employed.

Europe, Algeria, India, Egypt, Natal and lower California. In the latter place it was extensively planted along the line of the Central Pacific Railroad. The large dark green leaves contain a pungent volatile oil, with a characteristic odor, which is noticed wherever the trees grow. For a long time these trees were planted in malarious neighborhoods, in the belief that their aroma prevented the prevalence of malaria, but any such result as was obtained was probably due to the improved drainage in marshy localities, brought about through their rapid growth.

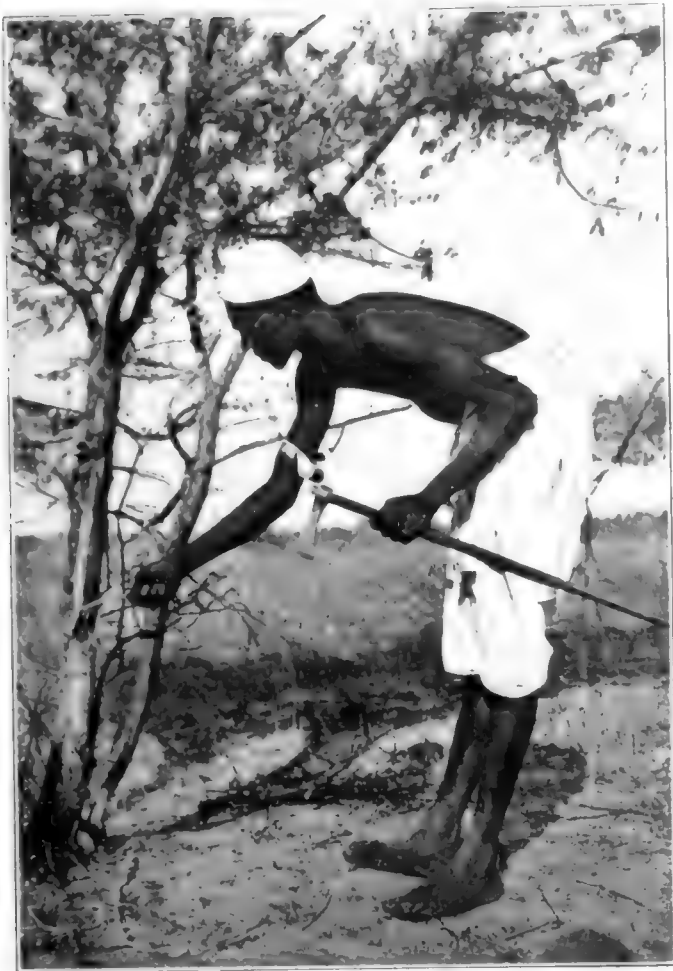
Oil of Eucalyptus, distilled from the leaves, is an antiseptic and carminative. It is much used as an ingredient of antiseptic oil sprays in catarrhal diseases of the nose and throat, and is also used in tooth pastes, mouth washes, etc., when a mild aromatic antiseptic is desired.

Before the throat specialist uses the soothing oil application, he may employ a more stimulating one containing the oil of the pumilio pine. This has practically the same field of uses as eucalyptol. Various conifers, the *Pinus pinaster* in France, the Scotch pine (*Pinus sylvestris*), the swamp pine (*Pinus australis*), the loblolly (*Pinus taeda*), the long-leaved pine, southern yellow pine, Georgia pine (*Pinus palustris*), are sources of oil of turpentine and resin.

Oil of turpentine has some vogue as a counter-irritant in various liniments, and externally and locally in abdominal distention in typhoid fever and after abdominal operations. Resin enters into the composition of resin cerate and is the basis for some plasters. A derivative of turpentine is terpin hydrate, a drug of great popularity and considerable value in coughs and colds.

The beech (*Fagus sylvatica*, *Fagus Americana*, etc.), which is found in the temperate zone in Europe, America and Asia, is valuable in medicine for the creosote distilled from its tar. Creosote, creosote carbonate and guaiacol are medicines used to supplement the hygienic measures which have done so much to reduce the death rate in sufferers from pulmonary tuberculosis.

One of the most ancient medicines is nut-gall, a spherical body which is produced on certain species of oak by the irritation of insects in laying their eggs in the leaves of the trees. Pliny, Theophrastus and Dioscorides wrote of the medicinal uses of nut-galls. Hippocrates, as well as Pliny, recommended them for ulcerated gums, sore mouth and other conditions. The Somali women of Africa make a tattoo pigment from nut-galls. They have long been used to make ink, and are the principal source of medicinal tannic acid. When nut-galls or tannic acid are employed to-day they are used for the same astringent



GUM ARABIC FROM THE ACACIA TREE

Natives of Senegal, Africa, where the tree flourishes, slit the bark in order to obtain the gum acacia or gum arabic. This is a constituent of important preparations in pharmacy, such as making of emulsions and in the preparation of pills and troches.

purposes for which they were recommended by the ancients. The galls are spherical bodies, $\frac{2}{5}$ to $\frac{4}{5}$ inch in diameter, and contain 27 per cent to 77 per cent quercotannic acid. The *Quercus infectoria*, of the Orient, furnishes most of the nut-galls, though the wood of all species of oak is also rich in tannic acid.

Whenever a pessimistic physician says that drugs never cure disease, some one is sure to ask him about quinine. For quinine is one of the few antiseptics which, taken internally, will kill an invading parasite without also killing the patient. Malaria is caused by a minute parasite injected into the blood through the bite of a mosquito. The parasite usually raises a new family every other day; hence the intermittent, chills and fever. Quinine, taken in proper doses and at proper intervals, will kill this parasite and cure the disease by destroying its cause. It is, therefore, a specific drug. There are few specifics.

In 1632 the Governor of Peru was much worried about his wife, the Countess of Chinchon, who was desperately ill with chills and fever. The Corregidor of Loxa recommended the bark of a certain tree which the Indians used as a medicine. The medicine was given and the Countess recovered. The bark was then rewarded for its

good behavior by being called Cinchona bark. The Jesuit order afterward introduced it into Europe, where it was called Jesuits' bark.

The *Cinchona calisaya*, *Cinchona succirubra* and other species of Cinchona are trees of various sizes, some reaching a height of 80 feet or upwards. Of the forty species, about a dozen are of economic use. They are native to New Granada, Ecuador, Peru and Bolivia and grow in dense tropical forests, in isolation or in small clumps. The work of securing the bark is of great hardship to the Indian *cascaidores*. Having found a tree, the *cascaidore* must literally hack his way to it, clean it of surrounding vines, and brush and strip the bark from its trunk, later felling the tree and stripping the branches. The



A GROUP OF MANNA TREES IN SICILY

Manna, the exudation obtained by incising the *Fraxinus Ornus*, is a remedy more esteemed by our grandfathers than by the present generation.

work of drying, packing and transporting this bark is done under equally adverse conditions, and the entire enterprise is difficult, dangerous and wasteful.

As early as 1854 the Dutch Government endeavored to cultivate cinchona in Java. A successful industry was established in the East Indies in 1861. Now it is cultivated in Ceylon, southern India, British Burma and many similar tropical climes, and is an industry of great commercial value. Of the several alkaloids found in cinchona bark, quinine is the most important, medically and commercially.

Ask any physician, "What is the most useful and most used stimulant to the heart and nervous system?" and he will answer: "Strychnia."

Strychnia is an alkaloid found originally in the seed of the *Strychnos nux-vomica*, the poison-nut tree, found in India, Burma and Siam, and growing also in Cochin China and Australia. It is of moderate size, and has a fruit the size of a small orange with a hard shell and a bitter pulp enclosing one to five seeds, less than one inch in diameter

and one-fourth inch thick and shaped like disks. It is the bitterest substance known, and when one has heart failure, or nervous exhaustion, or is run down or needs a tonic, some doctor is sure to give him the alkaloid from one of these peculiar Indian trees. Text-books on medicine frequently refer to "emergency heart stimulants," meaning by this drugs used by hypodermic injection to produce prompt stimulation of a weakened heart. Some of the most valuable heart stimulants require a good deal of time after being given to produce their effects, hence the need of emergency heart stimulants. Strychnine, we know, is a splendid emergency heart stimulant. But another one, hardly less valuable, is caffeine.

Caffeine is a principle discovered in the coffee bean, which grows on a bush, not a tree—the *Coffea arabica*. Tea leaves contain a substance, identical with caffeine, called theine. The most important commercial sources of caffeine are tea leaves and the kola nut. The kola nut is the seed of the *Sterculia acuminata*, a tree found in Guinea, especially near the coast, and now cultivated in South America and the West Indies. It is a very important commercial product to



TAKING MEDICINAL TREE PRODUCTS TO MARKET IN CEYLON

These unwieldy carts, drawn by patient bullocks, are the chief means of transporting to market in Ceylon the several tree products obtained there which are used in the manufacture of medicines. These carts are loaded with cinchona bark and cinnamon.

the portion of Africa where it is found, because it is rich in caffeine and contains besides a somewhat similar substance called theobromine. For generations the natives have been accustomed, both in health and disease, to chew the kola nut as a stimulant.

Caffeine is a powerful drug, for it stimulates not only the heart, but also the depth of the respiration, the working power of the muscles, the excretory function of the kidneys, and is the one drug which will stimulate the thinking mechanism of the brain and increase the imagination. To the native of Guinea the kola nut corresponds to our morning tiple of coffee.

Another African tree which has various species—several hundred in fact—throughout the world, and is of some medical interest, is the Acacia. The *Acacia senegal* is the type of tree which furnishes gum acacia, or gum arabic. While acacia is not possessed of any marked curative properties of itself, it is a constituent of many important preparations in pharmacy, as, for instance, in the making of emulsions, where its heavy mucilaginous qualities make it a valuable vehicle for oily and resinous substances. It is also widely used in the preparation of pills and troches.



CINNAMON USED MEDICINALLY

Natives of Ceylon preparing cinnamon by loosening the bark from twigs and branches. This is used as a medicinal agent, but more as a flavor.

Gum catechu, a substance containing tannic acid and used in dyeing, which was at one time extensively used as a remedy in colitis and dysentery, comes from the *Acacia catechu* and *Acacia sumnis*, both native to India.

We know that the Willow is useful for its timber, for basket-weaving, paper pulp, etc. The crack willow (*Salix fragilis*), the white willow (*Salix alba*), the weeping willow (*Salix Babylonica*), and many other species, are known. All are useful to produce medicinal charcoal and all contained salicin, a glucoside, and the forerunner of salicylate of soda, salol, aspirin, etc.—almost specifics for acute rheumatism and grippe, and among the most useful of modern therapeutic inventions. Although salicylic acid is made commercially from carbolic acid and soda, and the occurrence of salicin in the willow is, therefore, of more theoretical than practical interest nowadays, there exists a tree the oil from which contains an almost chemically pure salicylic compound, methyl salicylate. This has practically undeveloped possibilities as a source of chemically pure salicylic acid, when a product is wanted superior to that made synthetically. The bark of the black birch, *Betula lenta*, yields this oil in distillation. The

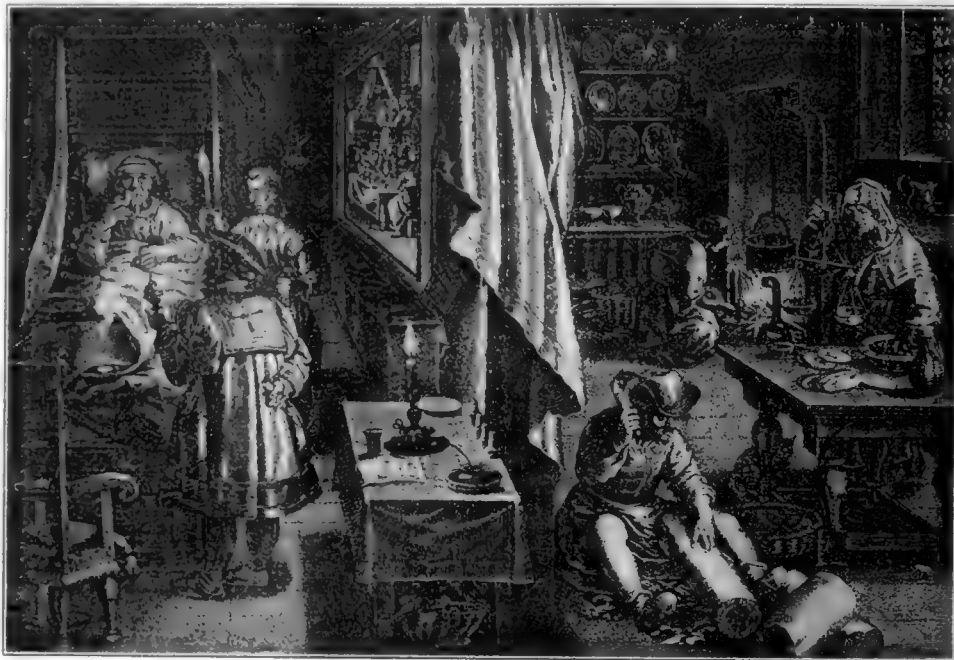
birches grow extensively in Europe, Asia and America; they have practical uses and may be cultivated in almost any northern climate. The relative cheapness of the synthetic acid has probably prevented the more extensive use of birch and wintergreen oils as sources of the salicylates. The old woodsman's medical lore, which came to him from the savage, taught him to use these oils to cure "rheumatics." Here again, as in the case of cinchona, of nux-vomica, of kola and of coca, the scientist has builded his highway to medical knowledge on the trail blazed by the savage.

The citrus group, orange, lemon, etc., furnish us with citric acid, useful as a solvent and as a flavoring agent, while the almond furnishes a bland oil, and its cousin, the wild cherry (*Prunus serotina*), has a waning popularity as the base of a cough syrup. The antiquity of the almond is shown by allusions to it in the Old Testament. Aaron's rod was plucked from an almond tree.

Another ancient sacred tree is the Sandalwood (*Santalum album*). References are made in the Chaldean inscriptions to this tree, and it is used in the sacred rites of the Buddhists. The oil has a limited use in medicine in certain catarrhal inflammations, and is employed in perfumery and sachets. It is found in India and the Pacific islands.

The Pomegranate is a rather small tree, but has many claims to medical antiquity. The *Punica granatum* is found in India, Afghanistan and the regions south of the Caspian. It is mentioned in the Odyssey and in the Old Testament. The bark is used as a remedy for tapeworm and is very effectual.

The *Myroxylon pereira* is a lofty leguminous tree, growing in a limited area in San Salvador and Central America, and cultivated in Ceylon. Balsam of Peru, a



SIXTEENTH CENTURY USE OF GUAIAIC

A print of the sixteenth century showing the pharmacy and medicinal uses of *Lignum vite*, or guaiac. On the right a man is chopping up the logs of wood, the woman is weighing out quantities of the drug, and a decoction is being boiled in a kettle. In the room to the left the physician is offering the beverage to the patient, who seems none too well pleased with the prospective draught.

viscid, aromatic balsam, used in surgical dressings and in perfume, is obtained from this tree. From its cousin, the *Myroxylon toluiferum*, comes balsam of tolu, once used in cough syrups. Another balsam, storax, employed as an insecticide, comes from an oriental tree, the *Liquidambar Orientalis*, while the sweet gum of the United States (*Liquidambar styraciflua*), furnishes a resinous sap employed medicinally for catarrhal troubles.

A majestic tree that flourishes in the East Indies, the *Dryobalanops aromatica*, is the source of borneol or Borneo camphor. Japan, or ordinary camphor, is obtained from the *Cinnamomum camphora*, a tree flourishing in Japan, Central China and Formosa. The crude camphor is obtained by distillation of chips of wood, and is later refined by sublimation.

Camphor is a well-known household remedy for external application. Internally it is of value in ordinary colds, coryza, and as a diffusible heart and circulatory stimulant.

Quassia, the bark of the *Quassia amara*, a South American shrub, named after its discoverer, the negro Quassin, who used it in fevers, is now largely replaced by so-called quassia wood, which is really the wood of the *Picranea excelsa*, or bitter ash, a tree found in Jamaica. It attains a height of 50 feet. It has little value in fever, but

is a bitter tonic, and its infusion is used to kill intestinal parasites.

Cinnamon, used more as a flavor than as a medicinal agent, is the bark of a tree, the *Cinnamomum Zeylanicum*, found in Ceylon. Benzoin, a gum-resin, used in medicine as an inhalant, and containing vanillin and benzoic acid, is obtained by incising the bark of the *Styrax benzoin*, a tree of considerable size, native to Sumatra and Java.

Resin of guaiac, used in gout, rheumatism and sore throat, is obtained from the heartwood of the *Guaiacum officinale*, or *Lignum vitæ*, a native of the West Indies and the north coasts of South America, which grows to a height of 20 or 30 feet. One of the most useful and delicate tests for the identification of blood is performed with the aid of an alcoholic solution of guaiac.

Myrrh, with gold and frankincense, was brought as



EIGHTEENTH CENTURY PRINT EXPLOITING QUASSIA

The bark of the *Quassia amara*, a South American shrub which is now used as a bitter tonic and an infusion of which is used to kill intestinal parasites, was believed in England in the eighteenth century to have almost every medicinal property. The print indicates that it cured apoplexy, palsy, constipation, debility, colic, stupor, dropsy, scurvy, dysentery, and other ailments.



CRUSHING MEDICINAL TREE PRODUCTS

In this etching of a drug store, in the year 1536, described by Otto Brunfels of Mayence, Germany, in his book "The Reformation of Pharmacy," the drug clerk is seen crushing in a large iron mortar some tree product used medicinally.

conservation of medicine-bearing trees, for there are many species whose existence is threatened by the present haphazard and wasteful methods of obtaining their products.

a gift to the Messiah by the Magi. It was valued by the ancients as a perfume, and was used by the Egyptians in embalming. Myrrh is a gum-resin, a product of the *Balsamodendron Myrrh*, a small tree which grows in Eastern Africa and Arabia. It is little used in medicine nowadays, except as an application in certain conditions of the gums. A curious survival is

the ancient custom, dating back at least to the time of Edward I, of presenting to the King of England on the feast of the Epiphany, gold, frankincense and myrrh, the ceremony taking place in the Chapel Royal.

These are some of the medicinal uses of substances obtained from trees. Much remains to be done in the cultivation and con-

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Conservation of American Wild Flowers

By R. W. SHUFELDT, M.D.

With this issue AMERICAN FORESTRY starts a series of articles on flowers by Dr. R. W. Shufeldt of Washington, D. C., a scientist who is internationally known and esteemed for his able writing on many scientific subjects. Dr. Shufeldt will give his special attention to these articles and in connection with them will answer any question and give advice regarding flowers to any members of the American Forestry Association.—THE EDITOR.

WHILE very considerable attention has been paid to the protection and conservation of the forests of the United States, there has not, up to the present time, been a corresponding solicitation engendered with respect to our indigenous flora, or to the long list of beautiful, flowering plants of the country. A great deal has been published—indeed, sufficient to form a young library—on the question of the extermination of a large number of species of our birds, and certain mammals have been extensively treated in a similar way; many kinds of insects, too, have received their share of notice at the hands of writers upon such subjects. For some reason or other, however, as just stated, the question of the extermination of certain of our wild flowers has been singularly neglected, and the public mind has but rarely been awakened to the fact that not a few of our most interesting and beautiful wild flowers stand in imminent danger of becoming extinct over considerable areas of territory, or even, in some instances, utterly exterminated.

Recently a number of interested and capable writers have invited attention to this matter, and it will attract still further notice in the near future. What I have said in the last paragraph will apply, perhaps, to towns and cities all over the world; and when I say perhaps, I have in

mind the cities of Japan. As the Japanese are great lovers of wild flowers, these artistic and cultured people may not habitually exterminate them in the environs of

their great cities; in any event, we may believe this until we know to the contrary. However this may be, there is no question but that it is going on in this country all the time; and the writers to whom I refer above have very conclusively shown that, where wild flowers were very abundant only a comparatively short time ago—in the outlying neighborhood of such a place as the New York Zoölogical Park in the Bronx, for example—they are now practically exterminated. This has been brought about by their not having been properly and systematically cared for and conserved. Within the jurisdiction of the Zoölogical Park the case is very different, for very stringent laws have been rigidly enforced, and, as a consequence, not a single blade of grass is bent down by human feet, nor are other plants injured if the authorities can prevent it. This is not the case, however,—be it said to our lack of care and foresight—with respect to the National Zoölogical Park and Gardens, where people roam at large, and hold populous picnics and other gatherings; flowers and shrubs, plants and trees suffer accordingly.

There are two principal ways of preventing this



GRASSHOPPERS EATING GOLDEN-ROD

FIG. 1. Two species of grasshoppers, feeding upon the leaves of the Common Golden-Rod at the end of summer. The ragged edges of the leaves indicate where that part of the plant has been devoured; in some instances nothing is left save the mid-rib of the leaf. This specimen was collected in the northwest section of Washington, D. C., and photographed by the writer from life, natural size. The open city lot, in which the plant grew, swarmed with these grasshoppers; it is very evident that these fellows are no conservators of wild flowers.



THE PINK AZALEA DISAPPEARING

FIG. 2.—This beautiful specimen of the Pink Azalea (*Azalea nudiflora*) was collected in southern Maryland early in the spring. This Azalea is classed among the shrubs, and grows from three to six feet high, though generally it is a branching, leafy bush. The clustered flowers come out about the same time as the leaves, or a little earlier, and they are of a rose or pinkish red color—sometimes very pale or almost white, with very little fragrance. It occurs coast-wise from northern New England well down into the Southern States, and blooms throughout the spring months in the District of Columbia. There are five small teeth to the calyx; note the funnel-formed corolla, with its five recurved lobes. There are five exerted stamens, with but one elongate pistil bearing a single, black stigma. The leaves are dark green with unbroken outlines and elliptical in contour. This elegant shrub is being rapidly exterminated in the environs of our eastern cities, where it formerly grew in abundance. It is frequently gathered in great bunches, only to wither and be thrown aside in the woods. Pink Azalea belongs in the Heath family.

species of vandalism: legal protection on the one hand, and the inaugurating of such steps in the community as will make for an enhancement of the tastes of the people on the other, to the end that a love for the beautiful in general, and for wild plant-life in particular, may be engendered.

Our wild flowers see another powerful and merciless enemy in the automobile, or rather in the thousands of people they daily convey from any one of our great cities into all parts of the country, far and wide, surrounding such metropolitan centres. How often we see one of these cars, homeward bound, its occupants holding large bunches of dogwood in full flower, and great bunches of many species of other flowers and plants that have attracted the eye, but not called into play that conservative sense which makes for the preservation and not the

destruction of all that is beautiful, and often useful, in nature. With other true nature-students, I love to see people bring bunches of flowers into the home, especially, if they be brought there for the purpose of careful botanical study along different lines of inquiry, or even for the purpose of at once placing them in a generous receptacle



BOTH FLOWER AND FOOD

FIG. 3.—Of recent years Chicory or Succory (*Chicorium intybus*) has occurred abundantly in some of the Middle Atlantic States, and in the District of Columbia; it is found growing in vacant lots in the very heart of Washington, and almost everywhere in the suburban parts of the city. Its brilliant blue—or sometimes white and even pinkish—flowers are familiar to many, enlivening the rank verdure flourishing where the plant thrives. The flowers wilt almost as soon as picked, and consequently many are needlessly destroyed. In the specimen here shown the flowers were a bright sky blue, with the buds in various stages of growth. They appear nearly sessile along the straight, fluted, branching and hairy stems, and are entirely odorless. The elongate, oblong petals are distally toothed or finely serrated, and the lanceolate leaves (not shown here) are entire. Confined chiefly to eastern districts, it came, nevertheless, apparently from far-off Arabia. Its long, somewhat stoutish roots furnish the chicory with which coffee is adulterated. In France a salad is made of its leaves, and the roots are eaten in Egypt. In Washington it blooms from mid-summer until late in the autumn. The specimen here shown is a good representative of the Chicory family, to which it belongs. It is reproduced natural size from a photograph by the author.

containing water, in that they may lend to the home that peculiar beauty and attractiveness that flowers alone can do. Clearly this is a very different matter compared with reverse instances, or where we see an outing party in an incoming car bringing quantities of wild flowers, flowering branches of shrubs, and the like. Only too often the smaller plants have been pulled up by the roots—a most vicious practice, and one leading to the certain extermination of the species so dealt with, as I have elsewhere pointed out. The collection of flowers and plants thus gathered is only too frequently tossed out of the car to wither on the roadside, before coming into the city; I can vouch for this from abundant personal observation, extending over a long time. Occasionally, such bouquets of flowers are carried as far as the entrance to the garage, where they are thrown into the alley or street, to be swept up with other refuse by those employed for such purpose.

In future articles, I shall have pleasure in pointing out in these pages the best methods to be pursued in studying the wild flowers near the home, and how such researches may be made to benefit, not only the student undertaking them, but the people in general. This will include the forming of an herbarium; the correct way to collect flowers; plant and flower-photography, and similar pursuits that it does not fall within the scope of the present article to touch upon.

Among the princi-

HELP TO SAVE WILD FLOWERS

THE beautiful wild flowers of this country are steadily decreasing, and some will soon disappear entirely, unless people give more attention to conserving them.

Pluck wild flowers without limit, if you wish, but do not pull them up by the roots, nor strip full branches from flowering shrubs and trees. This will prevent their destruction.

Public education is necessary. Repeat the paragraph above to children and adults and ask them to pass it along. It will help.



VIOLETS ARE RAPIDLY DECREASING

Fig. 4. Here we have the Bird's-foot Violet (*Viola pedata*), a most lovely representative of the Violet family, it occurs from Maine to Minnesota and southward. This charming member of a truly historical assemblage of very familiar and much admired flowers the world over, is now being rapidly exterminated in the environs of many of our eastern cities and towns, where formerly it flourished in great abundance. During the month of May, which is the time of its blooming, rambblers through the woods often gather the flowers in bunches of from fifty to a hundred or more. Frequently the plant, growing in loose soil, is pulled up by the root, which results in its more certain destruction and ultimate elimination from many districts. This photograph was made of a plant growing in the woods of northern Vermont, and well shows how the flower forces its way through the dead oak leaves in the spring. The firmest of the leaves is well shown, the flowers show the appearance of two perfect ones, while the three others are at the various stages of final curling up. This specimen is probably *Viola pedata bicolor*, a most elegant variety of the common form. The upper petals are of a rich purple, and as soft as velvet, the three lower ones being very pale and arranged as shown in the illustration. We have a number of species of violets among our wild flower flora, and mention is made of them in many classes and kinds of literature.

pal plants and shrubs standing in need of protection, with respect to thoughtless and injudicious gathering, I may mention, first of all, our Trailing Arbutus (*Epigaea repens*), so well known to those who know anything at all of our more familiar species that a description here is rendered quite unnecessary. As a flower, it is one of the favorites in American history. In New England it is known as the Mayflower, as it is one of the earliest flowering species of spring. Whittier loved its blossoms, and in one of his beautiful

poems he said of it:
"O sacred flower of
faith and hope,
As sweetly now and
then
Ye bloom on many a
birchen slope,
In many a pine-dark
glen."

And Neltje Blanchan, in her charming "Nature's Garden," asks us: "Can words describe the fragrance of the very breath of spring—that delicious commingling of the perfume of arbutus, the odor of pines, and the snow-soaked soil just warming into life? Those who know the flower only as it is sold in the city streets, tied with wet, dirty string into tight bunches, withered and forlorn, can have little idea of the joy of finding the pink, pearly blossoms freshly opened among the withered leaves of oak and chestnut, moss, and pine needles in which they nestle close to the cold earth in the leafless, windy northern forest."

I can remember when, fifteen or twenty years ago, great patches of arbutus could be found in many locali-

ties about Washington, well within the city limits; but now one frequently has to hunt long and well to find it in sufficient quantity to make a small bouquet. The plant is becoming more and more rare every year, not only because the city has three or four times its former population and a great many more people ramble through the woods than formerly, but the increasing rarity of the flower is to be accounted for by the gatherers culling it in excess of their needs. Then, too, as I said before, less pains are taken in plucking the flowers—the delicate little trailer is only too often pulled up, roots and all. Posted preserves and other deterrents militate against this to some extent; but I have faith in the true American; were he or she to know of the damage they do, a simple appeal would have the effect of saving many a growing plant of trailing arbutus.

What I have said here about this flower applies to not a few other species, such as red cardinal, blue cardinal, various species of violets, especially the bird's-foot violet, here shown in Figure 4, the bluets (Fig. 5), bloodroot, anemones, and others. With such flowers as black-eyed susans, golden-rod, and so on, little harm is done in this way, for these plants grow in such wonderful abundance and profusion—sometimes covering acres—that they defy reduction through excessive culling.

Shrubs suffer in a somewhat different way, for here the branches of varying sizes are deliberately broken off—generally the ones nearest the ground and bearing the greatest profusion of

QUESTIONS ABOUT FLOWERS AND SHRUBS

A **AMERICAN FORESTRY** invites inquiry about flowers or shrubs. These inquiries will be promptly answered. There will be no charge. Questions about the structure and physiology of plants; their distribution and conservation; their economic uses, if proven; their friends and enemies, including birds, insects, and other living forms,—indeed anything that refers to their natural history will be answered.

American Forestry also aims to exploit anything that lends itself to inducing our boys and girls to study and collect American wild flowers; to photograph them, and form botanical clubs where collections of pressed flowers may be kept for the use of members.

Address all inquiries to
AMERICAN FORESTRY,
Washington, D. C.

flowers. In a few seasons—sometimes even in one season—this results in entirely destroying the shape of the tree or shrub, in seriously diminishing the amount of its normal floescence, and in damaging the growth generally. Usually the pink azalias (Fig. 2), the dogwoods, and others that can be reached for the purpose, are the victims of the vandalism to which reference is made. I feel that the present article will not have been written in vain should it have the effect of checking, to any degree whatever, the steady destruction that takes place every spring—sometimes all summer long—of the wild flowers in the woods and fields surrounding our populous cities.

Although not altogether within the scope of the present article, I am sure it will not be taken amiss when I invite attention to the fact that, in many places—more particularly in certain cities in California—a taste has arisen, and in some instances very extensively cultivated, for the care of many species of our wild flowers in gardens, or under conditions demanding even more land than a garden amounts to—something after the out-of-doors nursery order. Here they are studied, photographed, cross-fertilized, and admired, often with greater pleasure and profit than in their normal places of occurrence in nature. This very satisfactory and encouraging taste is also to be noticed in certain places in the eastern districts, and it should by all means be furthered by any one who aims to assist in preventing the extermination of many of our



FEWER QUAKER LADIES EVERY YEAR

FIG. 5.—The quaint little four-cleft Bluets or Quaker-Ladies represent another flower that is often ruthlessly gathered, only to be thrown away with others picked at the same time. It may be well to know that if a bunch be plucked by themselves, they will last a long time in a little vase filled with water. It occurs more or less abundantly, from all the northern parts of the United States to Michigan and southward. Few wild flowers are better known than this little attractive light blue beauty, with its yellow center. In the spring before last the author photographed an exceptionally fine plant, and the same is here reproduced natural size. It belongs to the Madder family. Structurally it is interesting from the fact that the flowers are dimorphous,—some having a long pistil and short stamens, the reverse being the case in other flowers. This arrangement prevents self-fertilization.

finest and most lovely wild flowers. A great many species thrive very well under the conditions just named.

Let us continue to bring wild flowers into our homes, for study as well as for the refining effect they never fail to have; but let us, too, in every way we can, discourage the wanton picking of them, especially the fatal practice of pulling them up by the roots.

PHILIPPINE ISLAND TIMBER

By ARTHUR F. FISCHER, *Bureau of Forestry, Manila*

AT different times in the past there have appeared in the various lumber journals of the United States articles to the effect that certain people claim or intimate ownership of large timber concessions in the Philippine Islands. As a matter of fact, about ninety-nine per cent of the standing timber of the Philippines is on public land and under the direct control of the Government. Extensive private timber holdings, such as are found in the United States, are unknown there; in fact, there is no inducement for any individual or company to attain such timber holdings under the present system of Government management of the timber lands. The Government develops the public forests under the license system, such licenses being granted for one year or for twenty years usually, the latter being the twenty-year exclusive license agreements, or concessions, as they are popularly known. All the larger lumber companies of the Islands are operating under exclusive license agreements and under such the company has the exclusive title (with the exception of the free use privilege) to the timber on the tract. The system means that if a prospective company shows sufficient good faith a concession is granted to the company, after the necessary advertising, etc., without the company having invested a cent in the timber. At no time has the company any money tied up in the standing timber, as the Government charges are only collected on the timber after it is cut. The enormous advantage of this system over private ownership is readily seen when it is realized that the money ordinarily tied up in standing timber can be invested in the logging and milling operations, while the company still has exclusive and full title to the standing timber, making it about as desirable as if the company owned it outright.

Details as to the obtaining of tracts of timber, location and areas of present tracts ready for development, capital required, and any other information along this line will be gladly furnished by the Bureau of Forestry at Manila to interested parties upon their request.

BOOKS FREE TO MEMBERS

An unusual opportunity to acquire some tree, bird and flower books free of charge is offered in a special announcement in the front of the magazine. These books are by experts on the several subjects and are not only desirable in any library, but of service in giving advice and instruction which will save the reader expense.

McALESTER'S LONE PINE

WHEN the street was paved in front of the Busby Hotel at McAlester, Oklahoma, someone with a kindly feeling for trees saw to it that this pine was spared. The tree stands in the middle of a wide street with ample roadway on either side and it is protected by a cement curbing and a wire fence stretched on iron posts.



A TOWN SAVES A PINE TREE

This stands protected by a high wire fence in the middle of one of the main streets of McAlester, Oklahoma.

There are thousands and thousands of more symmetrical pines in the forests that come to the very edge of this picturesque hill town in eastern Oklahoma, but this scragged veteran of the woods had prior rights that were respected. He was there among his own kind long before the foot of white man tramped over the McAlester ranch; he was there before the Choctaws came over from Mississippi under treaty with Uncle Sam. Nobody knows just how long he has been on that spot, watching the axeman strike down his fellows one by one. He saw the brick and stone buildings go up on Choctaw Avenue, at the foot of the hill, and when workmen broke ground for the hotel on the very street over which he was keeping his lonely watch he thought his time had come. When they began to lay brick on the kindly turf at his feet he gave up hope.

Suddenly he noted something unusual right down below his branches. A workman chalked off a ring and set a barrier of artificial stone against the paving that effectively kept his enemies at bay. And so he stands today a lone sentinel, a reminder of time forever gone, a refuge for birds, casting a slanting shadow to momentarily bless the passing wayfarer.

National Highways in Florida

BY MRS. KIRK MUNROE

THE great Dixie Highway, running south from Chicago for more than one thousand miles, finds its terminus in Dade County, Florida, at the boundary line between Miami and Coconut Grove. Throughout its entire length it has a reputation for beautiful scenery, carefully planned borderings of ornamental trees, shrubs, and flowers, as well as for smooth, hard-

mile or more, by "Viscaino," the magnificent winter home of Mr. James Deering, also of Chicago.

At this terminus, the Dixie merges in the Ingraham Highway, the most southern road of the whole national highway system. Over its smooth, hard-oiled surface the traveler may penetrate nearly one hundred miles further, Uncle Sam's Mainland Tropics, until, at Cape Sable, he reaches their extreme limit.

This unique highway, bordered on one side by the Everglades, and on the other by the salt waters of Biscayne Bay, is named after the Honorable James E. Ingraham of St. Augustine, who discovered South Florida for Henry Flagler, and who has done more than any other one man



ON THE INGRAHAM HIGHWAY

The famous Traveler's Tree (*Ravenala Madagascariensis*) of which there are many along the fine highway which runs one hundred miles into Florida until Cape Sable is reached.

surfaced road-beds, among the best of which are those found along its Dade County sub-division.

The unique slogan of the Dixie Highway, "Plant a tree for every baby along the line!" was first heard in Florida, and in that State it already has been answered by many miles of planted trees.

The Dixie Highway was officially opened on October 24, 1915, with a three days' celebration at Miami when the first automobiles to cover the entire route ended their long journey from Chicago.

One of the most notable features of this highway is a wonderful open-air Aviary and Bird Sanctuary, recently established by Mr. Charles Deering, of Chicago, on his southern estate that borders the road for miles just north of Miami. Here, too, also bordering on the Dixie Highway, Mr. Deering has deeded to the Government a large tract of land to be used by the Department of Agriculture as a tropical experiment station.

Ten miles further on the Dixie Highway finds its southern terminus at another beauty-spot, amid the superb collection of tropical flora displayed on both sides, for a



THE SCREW PINE (*PANDANUS UTILIS*)

These trees may be seen along both the Dixie and the Ingraham highways. On the Dixie the slogan is, "Plant a tree for every baby along the line!"

for its development. The highway that he explored traverses dark tropical forests, mangrove swamps, and crosses the vast saw-grass marshes of the Everglades. It passes orange, grapefruit, and lime groves, through others of avocados, or mangoes, besides great pineapple patches, and vast fields of tomatoes ripening in midwinter; also, and above all, it crosses "Paradise Key" through the superb Royal Palm Hammock, the great State Park that is maintained by the Florida Federation of Women's Clubs.

Half of this wonderful highway is already constructed, while the remainder, through the 'Glades, is under contract, with work on it in active progress. The road-bed is 24 feet in width and has a central driveway of crushed and heavily rolled rock, overspread with tarvia. When

completed, it will be bordered along its entire length with palms, and other tropical trees, interspersed with hibiscus, oleander, and other brightly blooming shrubs.

For its first thirty miles it traverses a section of country already cultivated and well settled. Here are located some of the finest winter residences with which people of



AT THE END OF THE DIXIE HIGHWAY

An avenue of Royal Palms (*Oreodoxa regia*) near where the Dixie Highway, after running 1000 miles from Chicago to Florida, is merged into the Ingraham Highway.

great wealth are beautifying this portion of the South, and all of these show picturesque gateways and carefully planted roadsides. Along the whole line, too, the beautiful wild life of the region, both animal and vegetable, is being conserved for the benefit of future generations.

The colors chosen for the great Dixie Highway are gold and white, and as the Ingraham Highway is under the especial protection of the Florida Federation of Women's Clubs, it is suggested that its colors shall be the same as theirs and that it shall evermore be known as the Road of the Gold and Green.

THIRTY-SEVENTH ANNUAL MEETING

The 37th annual meeting of the American Forestry Association will be held at Washington, D. C., on Thursday and Friday, January 18 and 19, 1917. All members are urged to attend. The program will be announced later.

SCHOOLS AND CAMPS IN FORESTS

INCREASING use of the National Forests for municipal camp sites and summer school locations is reported by the Forest Service. Permits have already been issued to several cities and educational institutions and other applications are expected. Officials say that far more people use the forests for public playgrounds than for any other purpose, and that this use promises to be one of the most important to which they can be put.

The city of Fresno, California, has been granted a permit for the use of a 15-acre camp on the shores of Huntington Lake, in the Sierra National Forest. It is reported that the city will establish a camp in which outings during the summer months will be provided at low cost for 11,000 school children and their parents.

In the same Forest a California State normal school is now occupying a tract of land which is rented from the Government under a long-term lease. A number of buildings have been erected, all of which, as well as many cottages and camps, are supplied with water from a water system installed by the Forest Service. In connection with the regular six-week summer course, this school gives a course in woodcraft and general forestry subjects. The students visit the nearby Forest Service ranger stations and lookout towers, and study the Government's methods of fire protection. Addresses on the work of the Forest Service are given by officials from time to time. The Georgia State Forest School has a camp on private lands on the Georgia National Forest where a summer course is given. A feature of this course is a series of talks given by members of the Forest Service stationed in the vicinity.

Los Angeles was the first city in California to establish a vacation camp in the National Forests. A tract of land in the Angeles Forest has been rented, and a large camp built, costing about \$8,000. This camp consists of a log and stone lodge, 46 furnished cottages, tennis and croquet courts, baseball grounds and handball courts. A 10-day trip can be made for a small cost which is within the reach of practically every one. By this means thousands of residents of the city have been able to spend their vacations in the mountains.

It is also reported that a San Francisco association is considering the establishment of a summer home for girls at Lake Tahoe on the Tahoe National Forest. Boy Scout troops regularly camp in several of the forests, and on one forest the Y. M. C. A. of a nearby city has leased a lot and put up a permanent camp.

Officials say that the National Forests offer unlimited opportunities for summer school and municipal camps, as well as the best opportunities for recreation to be had anywhere in the country. Ample provision is made for campers and tourists. Hunting and fishing are allowed in season, and there are no restrictive regulations beyond those regarding forest fires.

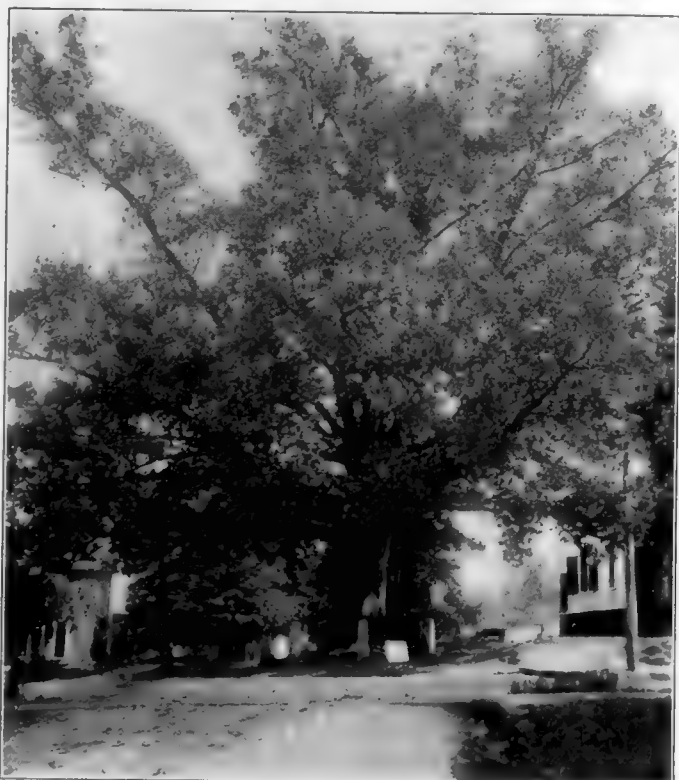
Members are requested to use blank under table of contents if they wish sample copies of American Forestry sent to friends.

THE TREE THAT OWNS ITSELF

BY T. H. McHATTON

Horticulturist, Georgia State Department of Agriculture

ONE of the most priceless possessions of the city of Athens, Georgia, is the tree that owns itself. This fine, healthy, white oak, *Quercus alba*, is unique in being the only plant in the world that possesses a deed to the ground upon which it stands. There is no way



THE TREE THAT OWNS ITSELF

William R. Jackson of Athens, Georgia, in his will bequeathed to this fine old white oak entire possession of itself and the land for eight feet on all sides of it. Later, George Foster Peabody placed the granite posts and chains around it.

of telling how old this magnificent specimen is. The tree is 12.2 feet in circumference 5 feet from the ground, and about 60 feet high. In the days before the war Mr. Wm. H. Jackson used to climb the hill that this tree crowns and rest in the shade of its branches. From this position he could look out over his farm that stretched in the bottom below the hill, and there, it is said, Mr. Jackson spent a great deal of his time. When he died, in his will was found the following bequest:

"For and in consideration of the great love I bear this tree and the great desire I have for its protection for all time, I convey to it entire possession of itself and all the land on eight feet of the tree on all sides."

Of course, the laws of the State of Georgia would not permit a plant to be its own owner, but the beauty of the idea was accepted by the people of Athens and they are proud to say that they have in their midst a tree that is its own master.

Some years ago, Mr. George Foster Peabody had granite posts and chains placed about the realm of this forest monarch and caused to be engraved on a tablet

of stone the quotation from the will and the name of William H. Jackson.

Besides this unique tree, Athens has many other beautiful plants. The city has always been the educational centre of the State and in its younger days had many citizens like William H. Jackson, who recognized the worth and value and beauty of trees, and these men so impressed the community with their reverence for plant life that in its modern development the city has saved its magnificent forest specimens for the edification of future generations.

URGES HUNTERS TO BE CAREFUL

EMPHASIZING the destruction of property and human life caused by careless hunters, a warning issued by the Forest Service urges all sportsmen on the National Forests to use the greatest possible care to prevent forest fires and to avoid such accidents as the one which caused the death of Forest Ranger Clark on the Cabinet National Forest in Montana last year. Mr. Clark, it is said, was mistaken for a bear by a careless hunter who fired without waiting to be sure what he was shooting at. To show that such accidents are not uncommon, the warning quotes an estimate of the Biological Survey that between 150 and 200 persons are annually killed in hunting accidents in this country and that this number is increasing. Furthermore, it is stated, 15 per cent of all the forest fires in the National Forests are caused by careless hunters and other campers.

The National Forests, it is pointed out, contain the best hunting grounds in the country. The number of game animals is increasing on account of the protection from forest fires and illegal killing which is afforded by Forest officers. On many of the Forests, deer, elk, mountain sheep and other species are fairly plentiful, while small game is usually abundant. Bear, mountain lion and other predatory animals are found on most of the Forests and the killing of these meat eaters is encouraged because they prey on domestic stock and the herbivorous game animals.

The value of the Forests for hunting grounds depends largely upon whether they are protected from fire, says the warning. Forest fires destroy the range and breeding places of the game and often kill large numbers of the animals themselves, while a great many more are driven out of the country by the flames. Furthermore, streams flowing through burned-over areas are subject to such extreme variations of flow and are often so choked up with deposits of sediment that fish cannot live in them.

Each year, it is stated, sees an increase in the numbers of persons who visit the National Forests for hunting and other recreation purposes. Every effort is made to encourage this use of the Forests. Maps showing the recreation resources have been issued, and the trails built by the rangers open up new country to visitors.

The best indication of a man's fitness to be in the woods, the warning points out, is the care which he shows in handling fire-arms and fire.

White Pines Threatened

The White Pine Blister Rust Existing Menaces Trees Which are Request For Public Aid

THE American Forestry Association requests the coöperation of its members in the endeavor to prevent the spread of the white pine blister rust, which threatens the destruction of white pine and all five-leaved pines in the United States and Canada. This disease has already appeared in thirteen states in the United States and two provinces in Canada.

The chestnut blight is rapidly destroying all the chestnut trees in the United States because no serious attempt to combat it was made until it was beyond the possibility of control. The white pine blister rust threatens similar devastation of the white pines, but there is still time to save them from the fate of the chestnut, if decisive action is immediately taken. The loss of the chestnut is a disaster, but the loss of the white pine, because of its wide distribution, the immense present value of the timber and the great future value of the young growth, is an impending calamity, appalling to contemplate. The most hopeful feature of the situation is due to the peculiar fact that it is necessary for the blister rust fungus to pass one stage of its life on the leaves of currants and gooseberries. Since the disease cannot spread if currant and gooseberry bushes are lacking, the destruction of currant and gooseberry bushes of all kinds appears to be a practicable means of controlling the disease, if it is done before the pines become infected.

The estimated value of the white pine is as follows:

New England States.....	\$75,000,000.00
Lake States.....	95,000,000.00
Western States.....	60,000,000.00
National Forests.....	30,000,000.00

Experts believe that if the disease reaches the Pacific Coast that the western sugar pine will also be affected. The estimated value of this western pine is:

Western States.....	\$105,000,000.00
National Forests.....	45,000.00

The valuation of the pines which are threatened by the disease is, therefore: eastern and western white pines,

\$260,000,000.00; western sugar pine, \$150,000,000.00, or a total of \$410,000,000.00.

Vigorous and immediate action is necessary. If the disease can be stamped out, it is much easier and less costly to do it now than it will be when it has a wider area of infection. Neither state nor government authorities alone or together have the funds or facilities or the power to

fight this disease the way it should be fought. Individual owners of timber lands, farm lands, wastelands, owners of gooseberry and currant bushes, and the general public must be aroused to a realization of the danger and the damage threatened. Earnest public agitation in all the states where the disease has appeared is needed, and needed now.

The American Forestry Association will devote itself to the work of saving the white pine, and earnestly hopes that all of its members will coöperate in every way they can.

The white pine blister rust, as has already been explained in AMERICAN FORESTRY, appears as a fungus which is parasitic on white pine trees. In the latter part of May and early June the spores are spread by the wind to currant and gooseberry bushes. On these bushes they appear as a yellow rust on the under

side of the leaves, but do no damage.

Throughout the summer they may be spread by the wind from bush to bush, and in this way have been known to infect large areas, even traveling at times as many as twenty miles in one summer. From late June until the leaves fall, another form of spore develops on the gooseberries and currants, and this is spread by the wind back to the white pine, where the destruction is caused.

Because of the rapid spread of the blister rust and the great damage which it causes to one of the most valuable timber crops of the country, foresters agree that it is necessary to destroy all kinds of currants and gooseberries until the rust has been thoroughly stamped out.

Government and state experts have been in the field for some time making investigations of areas where the rust has appeared and also in examining gooseberry and currant

HOW TO PREVENT THE SPREAD OF THE WHITE PINE BLISTER RUST

Experts declare that the way to prevent its spreading is to:

Destroy all gooseberry and currant bushes, wild and cultivated (including flowering currants), in and near sections where the disease prevails.

Destroy all five-needled pine trees on which blister rust infection appears.

Prohibit the shipment of white pine seedlings from infected sections.

Plant no white pine trees unless the source from which they come is known, and then only when state or government authorities vouch for the fact that the trees are free from blister rust and that it is advisable to plant them.

By Destructive Disease

in Thirteen States and in Canada
Valued at \$260,000,000

in Preventing Its Spread

bushes and pine seedlings at nurseries, and their investigations have reached a point which now leaves no doubt of the grave danger of the disease or of the fact that it has already spread sufficiently to make the danger imminent.

The Massachusetts State Board of Agriculture recently invited State Forestry officials of adjoining states and government officials to meet at Fall River, Massachusetts, for the purpose of observing the effect of the blister rust on native pines in that locality, and to discuss methods of checking the spread of the disease.

Throughout all of this summer, it developed at the conference, scout work has been done in the six New England States and in New York, New Jersey, and Pennsylvania, which showed that in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut, the blister rust disease is already thoroughly established on both imported and native trees. In certain sections of eastern New York and in portions of New Jersey and Pennsylvania, it has gained a foothold.

The result of the conference was that a committee representing the states of New York, New Hampshire, Vermont, Massachusetts and

Rhode Island took immediate action in issuing a warning to the public which concludes with the following statement:

"The currant and gooseberry bushes in large areas throughout New England states and eastern New York are now infected with the blister rust in the stage when it returns to the white pine, and the immediate removal of currant and gooseberry bushes is necessary to save our white pine trees."

The United States Department of Agriculture, through the office of Forest Pathology, is cooperating in scouting for the blister rust in practically all the states where white pine is an important native tree. At the present time, scouting has been completed in but two states—Maine and New Jersey.

Seven points of infection were found in New Jersey; in five instances blister rust infection was found in commer-

cial nurseries, the remaining two cases being stock from the infected nurseries.

The situation in Maine is much more serious. The rust fungus has been found generally prevalent on currants and gooseberries from the extreme southwestern corner of Maine, about Kittery, to Bar Harbor, and throughout the territory northward to Rangeley, Greenville, and Mill-

nocket. Wild growths of currants and gooseberries are found practically over the entire state on the roadsides, pastures, fields, swamps and rocky hillsides and comparatively level forest land.

Infected pines were found at Bar Harbor, Bath, Lewiston, Riverton Park near Portland, and Kittery.

There are enough wild gooseberries and currants in the State to carry the blister rust to every pine tree, and sweep out of existence the white pine forests of the state. What this means is evident when it is considered that white pine in the state is second in value to spruce; that the lumber it produces represents almost nine per cent of all the white pine in the United States.

The rust has also been discovered at nurseries on gooseberries and currants and white pine seedlings in other New England States, Penn-

sylvania, New York, Ohio, Indiana and in plantings of white pine in Wisconsin and in Minnesota, and there is practically no doubt but that the disease is making steady progress in all of the states mentioned in this article.

New York State has taken firm hold of the white pine blister rust problem in an endeavor to prevent the spread of the disease from the badly infected western part of Massachusetts. For this purpose an emergency loan of \$15,000 was authorized in August by Governor Whitman and thirty-five men under the supervision of the State Department of Agriculture and the Conservation Commission were set at work in Columbia County creating an immune zone two miles wide along the Massachusetts border by digging up and destroying all gooseberry and currant bushes, both wild and cultivated.

WHERE THE WHITE PINE BLISTER RUST HAS BEEN LOCATED

MAINE
NEW HAMPSHIRE
VERMONT
MASSACHUSETTS
RHODE ISLAND
CONNECTICUT
NEW YORK
PENNSYLVANIA
NEW JERSEY
OHIO
INDIANA
WISCONSIN
MINNESOTA
PROVINCES OF
QUEBEC-CANADA
OTTAWA-CANADA

Safety First in Tree Planting

BY PERLEY SPAULDING AND CARL HARTLEY

THE city man of to-day who buys a good apple wonders why it costs more than an orange. He used to buy apples for a fraction of their present price. He never can realize all of the reasons for this high cost until he visits a commercial apple orchard and sees the expensive spraying outfits and the hundreds of gallons of costly fungicides and insecticides with which the trees are sprayed during the early part of each season in order to protect the fruit from parasites. The amateur who tries to raise good fruit, or, in fact, any highly specialized crop, often is bewildered, if not beaten, by the variety of pests which attack his crops, the multiplicity of operations necessary to prevent or combat them, and the entire lack of efficient control methods for some of them. A very large part of the high price of food products is due either to the losses caused by insects and fungi, or to the expensive measures needed to prevent their attack.

This condition has valuable lessons for people engaged in other lines of work. The experience of the farmer will be of value for the tree planter if he will but read the handwriting on the wall and take heed thereto. Our forest trees are not now attacked by any such array of destructive pests as are cultivated crops. They never will be if we use proper caution now. Carelessness now is certain to result finally in putting the tree planter in much the same condition as are the fruit and truck growers now, and without one-tenth of their opportunity for effective control of established pests. An ounce of prevention now will be worth many pounds of cure later.

The imperative need for preventive measures and the methods of prevention needed will be best understood after a more detailed consideration of the crop disease situation. There have always been diseases of crop plants. Before plant diseases were investigated, and we acquired our present exacting standards as to fruit quality, many cases of parasite injury went unnoticed or unrecognized. But we now have more trouble than we used to. Part of this is due to our modern extensive methods. A great part, however—

probably the greatest part—of our increased trouble is due to new parasites. Many of these we would never have had, if our fathers had been properly careful in their importation of plants. As a direct result of their heedlessness and ignorance of plant diseases we must pay a perpetual tax in the form of higher prices on everything we eat.

HISTORIC INVASIONS OF PARASITES

A list of a few historic invasions of parasites on agricultural plants may not be out of place.

1. Hollyhock rust. Introduced from Chile. Serious pest here, and has practically exterminated both the wild and cultivated mallows in certain sections of Europe.

2. Late blight and rot of potatoes. Probably from South America. Reached Europe and United States about 1835. Helped cause the great Irish famine, in which thousands of people starved to death. It reappears practically every year. The total annual loss is enormous.

3. Phylloxera and grape mildew. Both native of America. Devastated the vineyards of France and the Mediterranean about 1855, forcing great numbers of growers to emigrate. For some years they nearly destroyed the wine industry of Europe.

4. Asparagus rust. European. Reached America in 1896. Has driven out of cultivation the most prolific American varieties.

5. Citrus canker. Philippine. California prevented its entrance by its rigid inspection and quarantine. It has now obtained a foothold in the Gulf States. Florida is spending hundreds of thousands of dollars and destroying every tree affected with the canker, in an effort to

exterminate it. The entire citrus industry of the Gulf region is in great danger, however.

There have been many such outbreaks. These five are merely striking typical cases. All of these diseases are still present in their new homes, and always will be, with the possible exception of the last. Half a dozen dangerous new parasites have gained entrance in the last ten years.



From Bureau Plant Industry Bulletin, 263.

THE ASPARAGUS RUST

Field at right, healthy. Field at left, ruined by asparagus rust, introduced into the United States as a result of the unnecessary importation of plants from Europe.

In most of these cases, the parasite was relatively harmless in its own country, but when it reached a new country and found susceptible new hosts it attacked them with infinitely more vigor than it did its native hosts.

Large scale importation of forest tree stock has been a more recent development than that of fruit and orna-

conditions existing, however, its complete eradication is becoming more and more doubtful. If this effort fails, profitable forestation with any five-needled pine in any part of the United States will probably in time become impossible. Will attract general attention within 15 years.

4. The European hard-pine blister rust and the pitch-pine bud moth, recently discovered in imported material. It is hoped that the rust has been entirely eradicated; the eradication of the moth is very doubtful as it is widely distributed already.

The parasites we have already imported are merely samples of what we are likely to receive in the future, if we do not enforce efficient preventive measures. There are a number of known destructive pests which have not so far appeared in this country. For example, the oak mildew, which has greatly troubled European foresters for the past few years and appears to be a much more harmful parasite than our American mildew. The pine twister (*Cæoma pinitorqua*) is another parasite even more to be dreaded than the blister rust. We should see that these and other known pests do not appear in the future. But more dangerous than the known harmful parasites are the hundreds of obscure foreign fungi, doing little or no damage in their native



Courtesy of Professor R. E. Smith.

WHAT ONE BLIGHT DID

This shows what the western pear growers had to do to save many of their orchards after they let the eastern fire blight parasite into the western fruit-growing regions.

mental plants. As a consequence, fewer forest parasites have reached us. But we have already had enough tree parasite invasions to give us stern warning of the danger. The following cases may be cited:

1. Gypsy and browntail moths. From Europe. Permanently established in New England and slowly spreading. Millions of dollars have been spent by the New England States, New York and the Federal Government in attempted extermination. This is given up and nothing is now attempted except the restriction of their migration and holding them in check by natural parasites. It took 20 years for the gypsy moth to attract attention.

2. Chestnut bark disease. Introduced from the Orient, almost certainly on nursery stock. Has already turned large areas of chestnut forest into waste land, and is steadily spreading. Probably will exterminate the present stand of American chestnut, despite earnest but spasmodic control efforts. Took 15 years for this to attract general attention.

3. White pine blister rust. Present in numerous importations from Europe. Thousands of dollars have been spent, and hundreds of thousands of trees and currant and gooseberry bushes have been destroyed in the effort to eradicate it. Scientifically this disease would not be difficult to eradicate. With the social and political



After C. L. Marlatt.

WHITE PINES KILLED BY THE GYPSY MOTH

Thousands of acres of forest have been wrecked by this introduced insect, and in 1907 Massachusetts spent \$750,000 in fighting the browntail and the gypsy moth in the effort to save the trees of the State.

habitats; some even entirely unknown to science, as were the chestnut bark fungus and citrus canker a few years ago. Any of these, when introduced into this country and given a chance at our great variety of forest trees, is likely to find a very susceptible host species which it

can entirely exterminate, as with the chestnut, or at least so injure as to destroy much of its commercial value. The virulence of such parasites cannot be foretold by the best informed plant pathologist in the world, because the effect of a new climate or of new hosts varies in each case.

MOVEMENT OF PARASITES

The problem of new parasites is by no means limited to importation from over sea. Great harm can result from the movement of a parasite from one part of the country to another. The history of crop pests here also contains valuable object lessons for the tree planter. The apple and pear furnish the best known examples. In the early days, fire blight, scab, codlin moth, and apple mildew were not present in the Northwest. The divides and deserts of the Rocky Mountain region presented a barrier which might easily have kept these diseases out of the Pacific Coast region for generations. Indiscriminate and

species, or the foreign species which have been introduced into the eastern United States. If the filamentous blister rust (*Peridermium filamentosum*) of the western hard pines and the very destructive leafless mistletoe (*Razou-*



By courtesy of Cornell Agricultural Experiment Station.

SCAB DISEASE OF APPLES

This disease is prevalent throughout North America and causes an estimated annual loss of \$30,000,000 in this country alone.

unregulated shipment of nursery stock from the East to the West saddled the Pacific Coast with all the worst pests in a short time, and many of them became even more injurious in the western climate and conditions than in the eastern. This took place before the present efficient inspection service of California was fully developed.

From the pathological standpoint the forests of the United States may be considered as comprising three reasonably distinct regions; the East, the Rocky Mountain, and the Pacific Coast. Each contains some trees and parasites not present in any of the others. Both of the western regions contain parasites which have never had a chance to attack the eastern American tree



Courtesy of Professor R. E. Smith.

PEAR BLIGHT ON PACIFIC COAST

What the pear blight did on the Pacific Coast, after the westerners allowed it to be brought to them from the East. The orchard in which this photograph was taken was completely ruined by the parasite.

mofskya spp.) which attack the western pines ever are introduced into the eastern region no one can guess how much damage they may cause. Recent inoculation experiments by Dr. G. G. Hedgcock have shown that one of the most harmful of the leafless mistletoes of the West is entirely able to attack at least four of the species of pine grown in the East. In addition to these well-known parasites there are numerous less important or little known western pests which, if accidentally introduced to the East, might easily become very destructive.

On the other hand, some of the relatively isolated Pacific Coast tree species, growing in a climate especially favorable for fungus development, are likely to prove very susceptible to the parasites of related eastern species. Even such cosmopolitan species as lodgepole pine and western yellow pine have already shown themselves remarkably susceptible to the northeastern pitch pine blister rust (*Cronartium comptonia*). Nursery stock of these species, raised in a Lake State's nursery where this rust is native, was much more seriously affected by it than are any of the eastern pines, being practically exterminated.

The white pine blister rust, which is very dangerously near to becoming permanently established in the East,

is certain to make trouble if it once enters the region of the western five-needled pine. It constitutes an additional reason for fearing the movement of parasites from East to West. The forester should profit by the costly lessons of the fruit grower, and take advantage of natural barriers to hold the forest parasites we now have to the regions they now occupy.

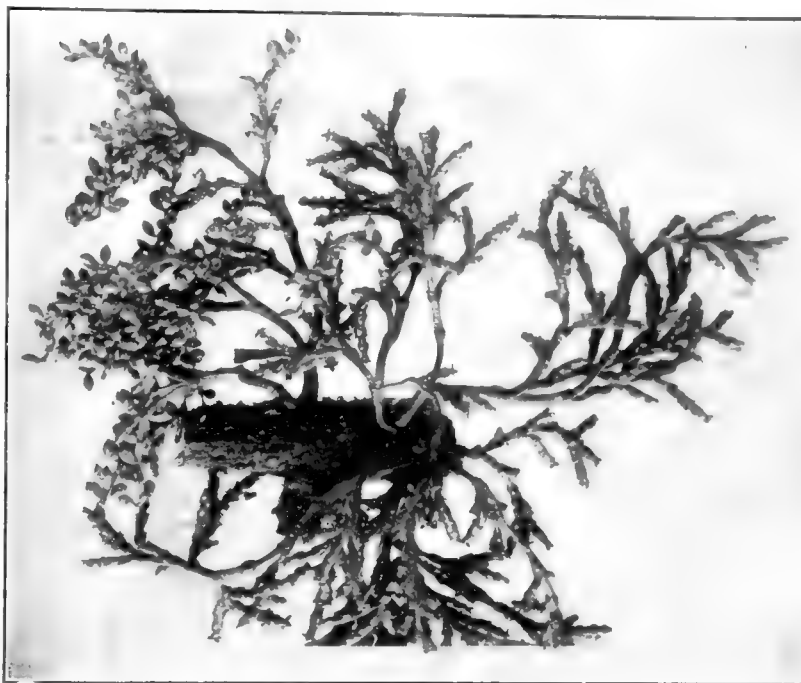
WHAT CAN BE DONE ABOUT IT?

Only a part of the pests we should fear have been mentioned in this article. The list of dangerous insects is particularly incomplete, as the writers make no pretense of entomological knowledge. But enough has been said to make it very evident that importation of additional foreign diseases, and the man-aided spread across the continent of parasites now limited to certain regions of our own country, is a serious menace to the future of American forestry. How then can we decrease this menace?

It is always possible for insects or fungus spores to be carried from one point to another on any commodity. However, plant parasites seldom invade new regions unless carried on or in some part of the plant they attack. With agricultural plants any part of the plant is likely to harbor a parasite, and exclusion of pests is therefore very difficult. With forest and ornamental trees the problem is easier. Very

method of long-distance transfer of tree parasites is on nursery stock, and in the materials in which that stock is packed.

The early attempt to prevent transmission of disease in nursery stock shipments was by inspection. Much dis-



From U. S. D. A. Bulletin 360.

KEEP THIS OUT OF THE EAST

The Pacific Coast yellow pine mistletoe, a very harmful western parasite, known to be capable of attacking eastern and European pines. Its seed may be carried on nursery stock from the West. Shipment of western stock to the East is therefore dangerous.



THE DEADLY CITRUS CANKER

Burning a diseased grapefruit tree with a crude oil blow-torch—the only method by which the disease can be killed without handling the diseased parts and spreading the infection.

few serious diseases of trees are carried in seed. Timber still bearing bark is capable of harboring many pests, but is not often shipped from one forest region to another except in the case of railroad ties and telegraph and telephone poles. This is a very efficient method of spreading the chestnut blight however. The principal

eased material has been kept out in this way, and great good has been done. But every one conversant with the situation realizes that inspection is only a partial safeguard. Blister rust and mistletoe may not show any conspicuous evidence of their presence on trees till two years or even more after infection takes place, so that stock carrying these parasites is very likely to pass as healthy. The most dangerous organisms, those which have not been serious pests in their native habitats, are still less likely to be caught by inspectors. Even so conspicuous and well known a disease as the chestnut bark disease can easily get past an inspector, as has already been too often proved. In the effort to meet this failing, the authorities have established quarantines against importations of certain plants. This improves the situation somewhat, but is also only a very partial safeguard. Following the American principle of allowing the maximum liberty of action, quarantines have been established only where the

danger was positively known to be great and immediate. Most of the quarantines have not been instituted until the parasite concerned had already become established somewhat in the country.

It is therefore evident that present inspection and quarantine measures are inadequate. They do not by any means

assure us freedom from the introduction of new pests, although they do much to prevent their introduction. There is one simple method that will keep us free from new parasites. Tree planters must limit themselves to stock grown from seed in the region in which it is to be planted.

It sometimes happens that the use of home-grown stock will involve delay or even additional expense. The ounce of prevention may cost a little money, inconvenience, or time, but its cost is infinitesimal when compared with the cost of the many pounds of cure needed to merely keep a serious disease in check after it has once become established. With its great range of climate, the United States can grow from seed any species of

any tree that can be grown here at all. The present disorganization of the import business offers an excellent opportunity for American nurserymen to make any needed preparation for supplying the entire home demand. There is no excuse, under present conditions, for us to continue dependent on foreign countries for any of our tree stock.

The lesson for the tree planter to take from the bitter experience of his brother agriculturists, then, is this:

In order to avoid further catastrophes like those caused by the chestnut bark disease and the gypsy moth:

1. Do not import nursery stock from any other continent.
2. Do not ship stock or buy stock that has been shipped across the regional boundaries shown in figure. Make sure that the stock you buy from your local nurseryman has been raised *from seed* in your region.



Each of the regions shown above contains dangerous tree parasites which should be excluded from the others. Shipment of nursery stock from any one of these regions to another is dangerous, even if the stock has been previously inspected.

3. If it should be absolutely necessary to buy stock from a nursery in another region, choose a nursery that is in a farming community, in open rather than in forested country, and that raises its own stock from seed.

Our tree planters deserve great credit. It is an excellent

thing to make two trees grow where but one grew before. But the man who leaves a heritage of pests as well as of trees will deserve no praise from succeeding generations. The method of avoiding disease introduction by planting home-grown stock is simple and relatively easy. After the lessons we have already had, the establishment of a new tree pest in any part of the country is to be regarded as an avoidable calamity.

FORESTERS TAKE BIG TRIP

AMES forestry students this summer took a three-months' trip through western and northwestern United States for the purpose of studying forestry. The party of fifteen consisted of forestry students and the members of the forestry faculty at the Iowa State College. The trip took the party through practically all the different forest regions of the west and northwest. Stops were made in Colorado, Utah, California, Oregon, Washington, Idaho, Montana and Minnesota. The longest camp, of three weeks' duration, was made on the Columbia National Forest in Washington, where unusually good opportunities were had for studying different lines of forestry work.

THE farm woodlots of the United States contain about ten per cent of the total standing timber in the country.

PLANTING ON HIGHWAYS

ARRANGEMENTS have been completed for cooperation between the Pennsylvania Department of Forestry and the State Highway Department in planting shade and fruit trees along the State highways. The Department of Forestry will grow the trees from seed in its big nurseries. They will be transplanted into areas set aside for the purpose, and when they have reached suitable size the trees will be turned over to the Highway Department and private good-roads organizations for planting.

THIRTY-SEVENTH ANNUAL MEETING

The 37th annual meeting of the American Forestry Association will be held at Washington, D. C., on Thursday and Friday, January 18 and 19, 1917. All members are urged to attend. The program will be announced later.

The Bird Department

BY A. A. ALLEN, PH.D.

Assistant Professor of Ornithology, Cornell University, Ithaca, New York

WHAT IS A GAME BIRD?

DURING the past few years the game laws of many states have been radically revised and the question of national and even international legislation for the conservation of game has been settled. There still remains unanswered, however, the fundamental question, What is a game bird? The federal migratory bird law and the game laws of each state of the Union define what are considered game birds within their jurisdiction but they are not identical. The laws of other civilized countries are

By the provision of the federal law and the recent treaty with Canada the following are recognized as migratory game birds:

(a) *Anatidæ*, or waterfowl, including brant, wild ducks, geese, and swans.

(b) *Gruidæ*, or cranes, including little brown, sandhill, and whooping cranes.

(c) *Rallidæ*, or rails, including coots, gallinules, and sora or other rails.

(d) *Limicolæ*, or shore-birds, including avocets, curlews, dowitchers, godwits, knots, oyster catchers, phalaropes, plovers, sandpipers, snipe, stilts, surf-birds, turnstones, willet, woodcock, and yellowlegs.

(e) *Columbidæ*, or pigeons, including doves and wild pigeons.

Among the insectivorous birds, the federal law makes an exception of the bobolink, declaring an open season on it, thereby rendering it also a game bird, but the treaty does not recognize it as such.

To make the list of generally accepted game birds complete, the non-migratory species should be added so as to include the wild turkey, the various grouse, bob-white, prairie chickens, pheasant, and numerous species of quail.

If we should add all the species that have ever been considered game by any state legislature or by sportsmen in any part of the country, we should have to include blackbirds, bitterns, herons, grebes, gulls, terns, flickers, meadow larks, robins and many others. But we shall confine ourselves to those more generally recognized and analyze the reasons for so determining them.

When the laws of Italy permit the killing of all species of birds during the migrating seasons they define, thereby, a game bird as any bird large enough to eat, and the line is not drawn at sparrows and larks, for even the little warblers fall before the guns. When our forefathers had just settled this country, on the other hand, and powder was scarce, hardly any bird, except the turkey, was large enough or good enough to merit the cost of ammunition. During some recent explorations in South America, where true game birds are scarce, the author, on the contrary, sometimes descended to shooting toucans, or even troopials, and made his own definition of game bird according to the needs of the camp and the resources of the forest. But to-day, in civilized United States, we must look further than this food requisite when we are writing our definition.

According to Webster a game bird is a bird pursued by sportsmen, and a sportsman is one who is skilled in



A FLOCK OF WILD DUCKS, BLUEBILLS

These waterfowl seen on Cayuga Lake, New York, satisfy all the requirements of perfect game birds, except that they travel in flocks, thereby permitting more than one to be brought down by a single shot and yielding less sport per bird killed than the grouse, woodcock or snipe.

still different, culminating in those of southern Europe where every species of bird is legitimate game. But again there are many extreme bird protectionists in this country who believe that hunting is a relic of barbarism, its age passed, and that no birds should be hunted for food or for sport. The question naturally arises, then, What constitutes a game bird? Shall certain species continue to be hunted for food and sport, and if so which ones and why? Shall game birds be the same throughout the country or is there some reason for the differences in definitions other than the will of the sportsmen or the whim of the legislature? By the recent federal measure many states have lost some of their time-honored game birds while others have had offered them certain ones that they have long since repudiated. Let us see which birds are generally recognized as game, and if there is some logical reason for their selection.

the sports, such as hunting and so forth. This, therefore, takes us one step further, for it intimates that skill is required to secure a game bird. We have then, two requisites: it must be good to eat and it must require skill to secure it. Ideally, the game bird is extremely wary and difficult of approach, but when properly hunted,



Photograph by G. C. Embody, Ithaca, New York.

A NEST OF THE RUFFED GROUSE

Great fecundity and a faculty for avoiding its enemies are requirements of a game bird. In this ruffed grouse nest are twenty eggs.

it lies close and unseen by the hunter until flushed and then jumps with some startling noise and flies away swiftly. Thus it requires, on the part of the hunter, stealthiness, keenness, alertness, coolness, quickness, and skill in the manipulation of the gun. Edibility is not a sure prerogative in judging a game bird, for tastes differ; fish-eating herons are relished by some people and a man's appetite in time of stress would make even the proverbial "boiled owl" taste good. The requirement of skill is insufficient in itself, for some of our most valuable insectivorous birds, such as the nighthawk or bullbat, make very difficult targets for the gun. This, then, brings up a third requirement: a game bird must not be more valuable in some other capacity than as game, such, for example, as a destroyer of insects or a beautiful songster. The nighthawk just mentioned, the swallows, the robins, and the meadow larks, which were formerly shot by gunners in many parts of the country, are much more valuable as destroyers of insects than they are as food for the table or as targets for the hunter. The herons, which only occasionally are valuable as destroyers of insects and often are destructive about fish ponds and trout streams, add too much beauty to our streams and shores to be shot. Their æsthetic value outweighs their value as game, particularly as they are not very good eating and require but little skill in shooting.

Another requisite of a game bird is that it must have

a large reproductive capacity or a faculty for avoiding its enemies so that it can withstand legitimate hunting without serious diminution in its numbers. The greater the returns in actual sport afforded for the number of birds killed, the better is the game. Those birds which travel in compact flocks, like the ducks and many of the shore-birds, so that more than one can be killed with a single discharge of the gun, are inferior in this respect to the grouse, woodcock, or snipe which get up singly. To sum up, then, the perfect game bird is one that is valuable as food and of little value as a destroyer of vermin; one that



Photograph by G. A. Bailey, Geneseo, New York.

A FLOCK OF HEN PHEASANTS

The ring-necked pheasant, a native of China, has been successfully introduced into many parts of United States, and is a valuable supplement to the native game. It satisfies all the requisites of the ideal game bird, except that it has considerable value as a destroyer of insects, and the cock birds are so brilliantly colored that they appeal strongly to the æsthetic.

is of little æsthetic value; one that taxes the skill of the sportsman to secure it, and one that is able to hold its own against hunting and all its other enemies. Let us see how well the various classes of birds withstand this examination.

First the *Anatida*, or waterfowl, including the brant, wild ducks, geese, and swans. They are all, except perhaps the swans, excellent eating and a valuable asset to the national food supply. Secondly, it ordinarily takes skill to secure them. Although they become tame and unsuspecting where they are fed and protected, wherever they are hunted they are extremely wary and they fly with great swiftness. They are of relatively little value as destroyers of insects, are even destructive about oyster beds and grain fields, and, with proper limitation to the hunting, they can hold their own. In one respect, however, they are not ideal game birds because they travel in flocks and frequently many can be brought down with a single shot, or, where automatic and pump guns are allowed, often a small flock can be wiped out at one shooting. The laws of most states and Canada allow the

use of these guns and permit a person to kill as many as twenty-five or even more in a day. This limit was established in the days of unsportsmanlike market-shooting, when ducks were merchandise, not game, and there is no private family to-day that could consume such a quantity of meat. Until this limit is considerably reduced and automatic and pump guns debarred, our waterfowl are still in danger of extermination. One other argument is sometimes advanced against considering them as game birds because of the charm which always attends their presence on our waters. When spring shooting was allowed, there was considerable ground for this argument



Photograph by G. C. Embody, Ithaca, New York.

A BOB-WHITE ON ITS NEST

The bob-white is a perfect game bird in most respects, but its greatest value is as a destroyer of insects and a purveyor of cheer and inspiration in farming districts. It should be removed from the game list. The nest here shown is under a garden fence.

because of their striking and beautiful plumages and their curious and interesting antics or displays. But in the fall they are, for the most part, obscurely marked, and it is the impressive force of the well-formed flocks against the dark clouds and the wild sweep of their wings that charm us—a feeling that is only heightened by the knowledge that they are game—that one's skill can be matched against their wariness and their speed with the possibility of legitimate reward. Were they never hunted, they would become like domestic fowls, most of the charm would be lost, and they might even become obnoxious.

Less can be said for the second and third classes of game birds, including the cranes, rails, coots, and gallinules. That they are edible is perhaps true, although inferior to ducks, and the little sora and Virginia rails, that are often shot in numbers, are so small as to make scarcely a mouthful. About the only excuse for shooting them is that they do no particular good, living as they do in the marshes where few insects, except the mosquitoes,

are objectionable. It requires very little skill to shoot them because they flush quietly and fly weakly and usually permit such close approach that they are knocked to pieces by the shot. Gallinules are somewhat larger but equally poor flyers and are usually shot as they run over the water. The coot, however, is much more duck-like on the



A MOURNING DOVE BROODING ITS YOUNG

In spite of the fact that the passenger pigeon has been entirely exterminated; showing that this class of birds cannot withstand hunting, the other species are still retained on the game list. Many states now give protection to the mourning dove and band-tailed pigeon, but the federal law and the recent treaty with Canada still classify them with the game birds.

wing as well as in its habits, so that there is some excuse for shooting it. Cranes are, of course, very much larger but they are rare everywhere, nearly exterminated by shooting in the east and one species (the whooping crane) is on the verge of annihilation throughout its range.

The fourth class, including the *Limicola*, or shore-birds, will answer to our definition somewhat better, although the smaller species of sandpipers and plovers have advisedly been removed from the game list by the federal law. Many of the larger species like the avocet and curlew are likewise protected for a term of years because they cannot stand the hunting and are rapidly being exterminated. The difficulty in their case lies in the fact that they travel in compact flocks and too many can be killed at a shot. The yellowlegs and the black-bellied and golden plover, which have been retained on the list, have survived the persecution somewhat better than the rest, but it would be much simpler and safer for all the shore-birds, as they are difficult to distinguish, if they too were removed for the period of ten years. The case of the snipe and the woodcock is slightly different for, although their numbers have been seriously depleted, under proper hunting restrictions they will be able to hold their own. They never travel in compact flocks and frequent much better cover than other shore-birds, the woodcock in the dense alder thickets and the snipe in the grassy marshes, and neither bird is often seen until flushed. Both fly swiftly and erratically, making a startling sound

when rising, and taxing the skill of the hunter severely. Neither is of great value as a destroyer of insects because of the nature of its haunts, and neither is of great æsthetic value because it is difficult to see even when its haunts are known, and both are delicious eating. Both have suffered severely from prolonged shooting on their wintering grounds where they cling to one neighborhood until killed, but shortening the season and lessening the bag limit should permit them to hold their own.

The last class of the migratory game birds includes

the wild pigeons and doves. That they are good to eat, there can be no question; that

æsthetic value aside from the charm which attaches to its gameness, it yields perhaps the greatest amount of sport per bird killed of any of our game, for it taxes the utmost skill of the sportsman when it thunders away through the dense woods. Where there is proper cover it will hold its own until excessively hunted and it increases quickly with the establishment of sanctuaries and although, as yet, it has not been artificially reared in numbers, the time will come when game preserves will be able to assist nature in replenishing the covers.

The introduced pheasant requires less skill to find and to shoot, has a somewhat greater value as a destroyer of insects and a more æsthetic appeal as it struts about the open fields, but unquestionably its greatest value is as a game bird, particularly as it is so easily reared artificially that covers can be restocked as rapidly as depleted. It is a valuable supplement to our native game. The question of the friendly little



A BOBOLINK IN SPRING ATTIRE

By the Federal Migratory Bird Law and many state laws, the bobolink is still considered a game bird, in spite of the fact that it is one of the greatest enemies of all the insect pests of the fields and at the same time is one of our most vivacious songsters. The bobolink in the photograph is feeding army worms and grasshoppers to its young.



A FEMALE RED-WINGED BLACKBIRD

This bird shows very well the strong feet and the bill characteristic of the family *Icterida*. The bird is at its nest in the reeds of the marsh.



A BALTIMORE ORIOLE

Although much more brilliantly colored, the orioles belong to the same family as the blackbirds. The bird is at its nest hung at the tip end of an elm branch.

it requires skill to shoot them, is undoubtedly true, if they are shot on the wing, because they are extremely swift. However, although they are not insectivorous, they do great good in the destruction of weed seed and they certainly have no mean æsthetic value, if we can judge from the inspirations they have given to writers and poets all over the world. Furthermore, pigeons or doves are not able to endure severe hunting, as attested by the total extinction of the passenger pigeon. The same fate is awaiting the mourning dove and the band-tailed pigeon, if they remain on the game list, but fortunately many states no longer regard them as such, giving them permanent protection, and the federal law has taken a step in the right direction by protecting the band-tailed pigeon for two years.

There remain for consideration the non-migratory game birds. The game quality of the wild turkey and the grouse is not open to question. They combine all the requisites which go to make up the perfect game bird. Excellent as food, the ruffed grouse, for example, will make a meal for two, or even three, persons; negligible or even destructive in its feeding habits, and of little

bob-white and the various species of quails is not quite so simple. The bob-white has all the requisites of the perfect game bird in being excellent food, requiring skill to secure it, lying close at the approach of the hunter, rising with a startling rumble and flying very swiftly, and so forth. But, on the other hand, it is of great value as a destroyer of insects and has an æsthetic appeal quite aside from its desirability as game. Its cheerful whistle, its confiding ways, its pleasing appearance are all in contradiction to its use as a game bird. The same may be said of the California quails, scaled partridge, and all the other species. There is a considerable movement on foot to remove the bob-white from the game list, and it is not without reason, for we cannot say of it, as we can of the grouse, or the snipe, or the waterfowl, that its greatest value is as game or food for the table.

So much then for the birds that are usually considered game birds. Of the others which are sometimes or in some places so regarded we will consider only the bobolink upon which even the federal law places an open season. In the first place, is it good to eat? Yes, like the nightingale tongues of the ancient Romans, it is said to be quite a delicacy. In the second place, does it require skill to secure it? Emphatically no; the gunner merely shoots into a flock, flying or sitting, and chance rather than skill determines the number he kills. Have they any other value? Most assuredly, yes; while their fall plumage is nothing but an obscure yellowish brown and their song is silent, no bird is more beautiful or more welcome about clover fields in June. With his striking black and white markings and his rollicking song, he has inspired the poets and is the friend of all.

“ Merrily swinging on brier and weed,
Near to the nest of his little dame,
Over the mountain-side or mead,
Robert of Lincoln is telling his name.”

Again during the spring and summer the bobolink is almost entirely insectivorous and of great value in destroying grasshoppers, army worms, and other pests of the fields. The accompanying photograph shows the male bird near its nest and in its bill one can see two army worms and a small grasshopper, speaking for the inestimable value of the bird. We can truly say, then, that the greatest value of the bobolink is not as a game bird and that it should be removed from the game list. The same is true of blackbirds, robins, meadowlarks, flickers, and the majority of other birds, not already considered, that one occasionally sees listed as game.

In the December issue we will consider the propagation of game birds and see what it means for the game of our country.

The writer desires to state that as readers of AMERICAN FORESTRY frequently desire to ask questions regarding birds, he hopes they will not hesitate to do so as he will be glad to answer them. Inquiries should be addressed to the Editor of AMERICAN FORESTRY and a reply will be sent promptly.

The Blackbirds and Orioles

(*Family Icteridæ*)

IF birds were classified by their colors or by their habits, this family would have to be divided into many, so divergent are various members which compose it. There are over one hundred and fifty species in the family, all of them confined to the new world, but only nineteen are found north of Mexico. Some of them are dull-colored and some are very strikingly marked, but all are similar in having strong, perching feet, tails of twelve feathers, pointed wings, and bills that extend backward dividing the feathers of the forehead and leaving the nostrils exposed and not concealed by bristles. To this family belong the well-known blackbirds, many of which show brilliant red or yellow patches, the orioles, which are perhaps our most gorgeous birds, the black and white bobolink with his finch-like mate, and the aberrant meadow lark that has taken on the streaked back pattern of the sparrows and the terrestrial habits of the true larks. As a family they are nearly omnivorous feeders, taking seeds, insects, and fruits. During the summer they all feed upon insects and are extremely valuable birds, but during the fall the many species of blackbirds assemble in large flocks and often do considerable damage.

Of the blackbirds, the red-winged or swamp blackbird, the cowbird, and the grackle or crow blackbird are the commonest and the best known. The redwing hangs its nest in the bushes or reeds of the marshes but after the nesting season visits the upland in large flocks to feed. The female is streaked gray and black and lacks the scarlet shoulders of the male. The cowbird is found about pastures following the cattle. It builds no nest of its own, but, like the European cuckoo, lays its egg in the nest of a smaller bird and lets that bird hatch the egg and rear the young. The male is black with a brown head, the

female uniformly grayish. The grackle is larger than either of the two former, uniform black with metallic reflections and with a long tail that it holds boat-shaped when it flies. It walks around the lawns in our parks, nests in a variety of locations but more often in the tops of tall evergreens where also in the fall large roosts often assemble. During the spring and summer blackbirds are almost



A MEADOWLARK AT ITS NEST

The meadowlark is an aberrant member of the family, for it has taken on the streaked back pattern of the sparrows and the terrestrial habits of the larks. The meadowlark has the same characteristic bill as the Baltimore oriole.

entirely insectivorous and very beneficial, but during the late summer and fall, when they assemble in large flocks, they change to a vegetable diet and in some places do considerable damage to grain fields. For this reason they are not considered insectivorous birds by the federal law, the treaty with Canada, or most state laws, and are not protected.

The orioles are almost entirely insectivorous, although they are fond of fruit and sometimes do a little damage to cherries and early pears. They never travel in flocks, however, and the damage they do is negligible. The Baltimore and orchard orioles in the East and the Bullock's oriole on the Pacific Coast are the best known. They are noted for their deep, pensile nests, marvels of bird architecture. They have loud, ringing whistles that make our woodlands and shaded roads musical during the late spring and summer, but their song period is short and they are among the first birds to stop singing in July.

The meadowlarks and the bobolinks are perhaps the most valuable birds of the open fields and are worthy of every protection even though the bobolinks do assemble in large flocks on their migrations and do a little damage in the rice fields. The meadowlark has a loud, clear, plaintive whistle that varies in different parts of the country, while the bobolink gives us a rare jumble of whistles, warbles, and banjo-like notes that seem to fairly burst with exuberance as he hovers over the meadows.

On the whole, the family *Icteridae* contains some of our most brilliant, most musical, and most beneficial species whose structure and habits are so varied as to make them a most interesting and fruitful study.

FOR NEW YORK FOREST LANDS

THE Executive Committee of the New York State Forestry Association, at a meeting held at Albany, New York, urged every public-spirited citizen of New York State to approve the Meier \$10,000,000 referendum providing funds for the purchase of land in the Adirondack, Catskill and Palisade Parks at the November election.

The following facts were cited in favor of its adoption by the people.

1. The purchase of mountain land in the Adirondack and Catskill parks has proven to be one of the few profitable investments ever made by the Empire State since the present holdings could be sold for some five times the original purchase price.

2. The use of these mountain lands is of increasing value to the State, not only from the standpoint of recreation value, but also from their importance in conserving the run-off of mountain streams.

3. By properly and systematically locating the purchase areas, present holdings could be consolidated to a large degree. In addition, lands in danger of denudation or partially burned lands could be brought under State control and so handled as to make them an asset to the State.

Members of the Executive Committee, however, expressed it as their firm conviction that, in view of the possibilities of extensive land purchases in the Adiron-

dacks and Catskills, the Conservation Commission should enunciate a clear-cut policy for the management of forest land, both public and privately owned, with the idea of avoiding any possible hardships to present owners. They also stated it to be their belief that a thorough boundary survey and stock taking of the present holdings were extremely important, since such surveys in the past have been largely ocular estimates owing to the lack of funds, and which are likely to be only approximate.

PARENT NAVEL ORANGE TREE

WITHIN the beautiful grounds of the famous Glenwood Mission Inn at Riverside, California, is an orange tree which has had such a history as to warrant it a place among the famous trees of the country.

It is enclosed by an iron fence, with a curbing at the



THE PARENT NAVEL ORANGE TREE AT RIVERSIDE, CALIFORNIA base, and the following tablet tells its story: "Washington Navel Parent Orange Tree—From Department of Interior in 1874—Replanted Here by President Roosevelt, May 8, 1903—Gift of Louis Jacobs."

Now that the navel orange has become such an important factor in the economic development of southern California, many people look with interest upon the original tree of the variety in its protected nook.

THIRTY-SEVENTH ANNUAL MEETING

The 37th annual meeting of the American Forestry Association will be held at Washington, D. C., on Thursday and Friday, January 18 and 19, 1917. All members are urged to attend. The program will be announced later.



SCENE IN DELVILLE WOOD, DEVASTATED BY THE WAR

A photograph showing the effect of intense artillery fire on forested land on the western battle front in Europe over which contending armies swept back and forth

There has been in this country much discussion upon the effect of modern artillery fire on forests in the European war zone, and the photograph printed here shows the frightful destruction wrought in thickly forested Delville Wood by bombardments which perhaps have not been excelled in intensity at any other point in the war zone. Delville Wood is on the Somme front and for the first two years of the war was held by the Germans. Like every wooded section along the battle front, it was subjected to frequent bombardment, as all woods so located serve as shelter for the movement of troops, the locating of guns and storage of ammunition. When the Somme advance of the Allies started, Delville Wood was one of the objectives of the British forces and against its powerful infantry attacks were aimed after several days of tremendous artillery fire.

Then ensued sanguinary struggles for possession of the Wood. British and Germans swept each other out of it several times. Finally the British retained possession and still hold the Wood. It was soon after they had gained it all that the accompanying photograph was taken.

As a shelter or a screen for artillery or infantry move-

ments it is now valueless. Not a tree remains whole, even the shattered trunks of but few remain standing. Trees were blasted into splinters by the explosions of the big shells and whole sections were mowed down by the torrent of fire which swept through them—but the photograph needs no word picture to describe it.

Most of the wooded sections along the battle line in France where contending armies have been in possession and which are exposed to daily fire are more or less in the same condition as Delville Wood. What has happened to the famous forest of the Argonne is described by Captain Granville Fortescue, formerly of the United States Army, and who is now in France, who says:

"Here and there a gibbet trunk still rises, a sort of skeleton tree standing as a stark symbol of the results of war. Scattered over the soil are rotting branches that bleach in the sunshine and the rain. The armies of France and Germany where they have pushed through this beautiful woodland are as the plague of locusts that sweeps through the green fields of grain in Argentina. Where the trench lines run, the trees, giant pine and stripling beech, have disappeared."

Forestry for Boys and Girls

by Bristow Adams

Chestnuts and An Old Story



CERTAIN little chap that I know very well, has a way of climbing up into his father's lap and putting this question: "Say, father, once-upon-a-time—what?" This poser is handed out when the small boy is likely to be tired

or sleepy, and about ready for bed. Sometimes the old "once-upon-a-times" will do, but very often the start of such a one will bring a strong and firm reminder that the "Three Bears," or "Hop-o'-My-Thumb," or "Jack the Giant Killer" won't fill the bill.

So the father has to search around in his memory for a tale that will pass. Very often, after such a search, and after the yarn has been spun the small boy is fast asleep, long before the moral has been reached.

This night we were all rather tired. We had been out in the high winds of a crisp cold day, gathering nuts. The chestnut-bark disease has not reached our part of the country yet, and we have also many hickory and butternut trees. Wherever we had gone, a red squirrel had chattered at us madly, for all the world like a sewing-machine run wild. Even the squirrels had no better hoard for the winter than the one we gathered, though they can use many kinds that we do not eat,—as acorns and the seeds of spruce and pine. In the Southwest the Indians eat both acorns and pine seeds, and have winter storage places for acorns, from which they grind meal. They eat the sweet-kerneled seeds of the pinon, which are very good indeed, and much larger than our eastern pine seeds.

This time, none of the favorite old stories would do; after some trials to call to mind a story that would seem to be new, the fact that we had gathered chest-

nuts during the day gave the cue for the old story that follows:

ONCE upon a time, then—for that is the right way to start—there was a prince; and you'll find that most such stories can not get along very well without a prince or somebody of that sort. He was a bad prince. Ever since he was a baby he had been given his own way. He broke all his toys and he wasted his food; he threw horse-chestnuts, in season, at the palace hens; he whittled the legs of the parlor tables and chairs; and he tore his clothes and ground out the knees of his stockings faster than the queen-mother and all the ladies-in-waiting could darn them up again. As he grew older he threw his money away on foolish things that did him no good and even did him some harm. He spent his time with bad young fellows, and he would not learn to do anything useful.

The king, his father, grew very angry at this, and in the end he told the young man to clear out, to leave the palace and not come back. More than this, as was the custom of that time, the king put a curse on the youth by which he would not have any more things to waste. This was easy for the king to bring about, because he owned everything for miles around. So when he told the prince that he was not to use the crops of the fields, the king could see that this order was fully carried out. He made a good strong curse while he was about it, did the king, and besides the crops of the fields, the young man could not have the use of the wealth of the mines, or of the fish that swam in the sea or in the streams that flow down to the sea. The beasts of the earth and the birds of the air were also forbidden. He was a hard-hearted old king, and the prince had been a waster and a wild spender.



So the prince was cast out, but he went forth with his nose in the air. In the back of his head he had an idea through which he hoped to play a trick on the old man.

THEN what do you think happened? The king rode one day beyond the line that marked where the prince could not return, and there he found a great house, beamed with strong oak and paneled with fragrant cedar. Roofs were covered with shingles or with thatches of leaves; rich hangings were there, made of beaten-out wood fibers and dyed with the sap of other woods, like the tapa cloths from the South Sea Islands.

That night the king got a note asking him to visit this big wooden house; and the note, of course, was signed by the prince, as you have already guessed. This great house was the prince's new palace. The note paper was made from wood, just as this paper is, and the wording on it was written with a cleft and sharpened wooden stick dipped in ink made from oak galls. At first the old king thought that he would not go, but he wanted to see just what the prince had been able to do without running into any of the curses. So he made up his mind that he would go and would find out for himself how the prince had gotten around him.

When he got to the new palace he found that it was brilliantly lighted with the oil of tallow-tree nuts burning away merrily in bowls made of cocoanut shells, in which wicks of twisted wood fiber were floated by disks of cork made from the bark of the cork oak.

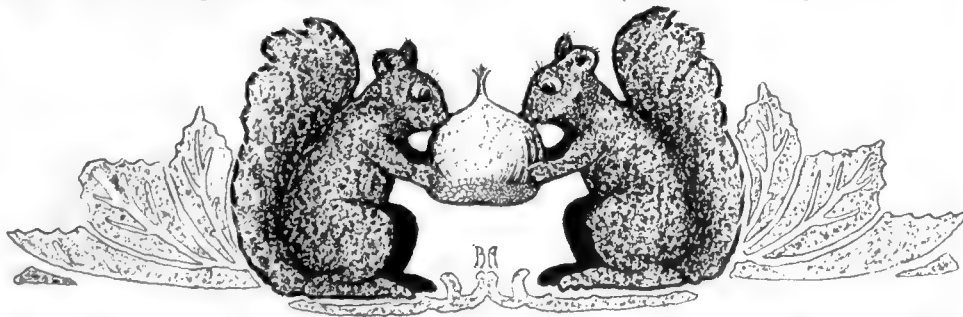
The tables were loaded with tree fruits. You can guess that there were

cherries, and apples, and oranges, and all such good things. But there was guava jelly, also, and roast plantains—somewhat like bananas,—and more kinds of nuts than you ever had at Christmas. Some were eaten raw, just as they were, and others were made into roasts or stews, exactly as you can find them to-day in the health-food eating-places. Besides chestnuts and chinkapins, pecans and hazel nuts, there were nuts from foreign lands. For example, there were the Brazil nuts, or "nigger-toes" that are packed every-which-way in a round hard husk. If you once get them out you can't pack them in again any more than the prince could get all the wheels back into the big clock on the palace stairs when, as a boy, he had taken it to pieces. Cocoanuts furnished milk and food besides, to say nothing of candy. Maple sugar was there in creamy chunks. For those who might like them there were betel nuts, pistachios, water caltrops, and cashew. The king hadn't even heard their names before.

He found some of these were very good, and he learned, while eating, that there were more kinds of nuts than he ever dreamed about. He nearly made himself sick from eating date-and-walnut loaf, it was so rich. He drank as much birch beer as if he had been a small boy at a New England circus. He ate persimmon bread for the first time, and he topped off on Chinese li-chi and pi-li nuts; but he did not much care for ginkgo kernels as a relish.

Musicians played soft-sounding wooden instruments,—the flute, the clarinet, the oboe and bassoon, and there were tunes on the xylophone, the very name of which means "the sound of wood."

(Continued on next page)



BEING quite full of food, the king was in a fairly good humor—for him. At first he chewed his whiskers a bit, thinking to himself what a chump he was to have forgotten and left out of his curse the great use of trees. Then he rather admired the prince for being clever enough to have thought of it, and to have worked out with so much skill the plan for the house and the big dinner.

Did the old king put his arms around the prince and say, "Bless you, my son; you have done nobly?" And did they make up and go back home together, and live happily ever after? No indeed, nothing so dull and tame as that. They still managed to fight now and then when they felt like it, and thereby to have just as much excitement as ever, but with a bit more respect for each other.

The prince mended his ways and, because the trees had been so useful to him, he spent the rest of his days in caring for them. He planted them and tended them, kept fires away and helped them to grow. Having something now in which he was interested, he found it easier to keep out of mischief. And he lived a long time to teach others the mighty use of trees, which the old king had forgotten all about when he made his list of forbidden items.

NOW the moral of this tale," I went on, "is that we must—" But looking down, I saw that the littlest boy was fast asleep. The tousled head was drooped and the brown little hands which had clutched some shiny chestnuts were unclasped, so that the nuts rolled down onto the floor when I lifted the lad and carried him up to bed. Anyhow, it won't hurt to keep in mind all the good things that the trees furnish us, and to try to do what we can to repay the trees by treating them well in turn.

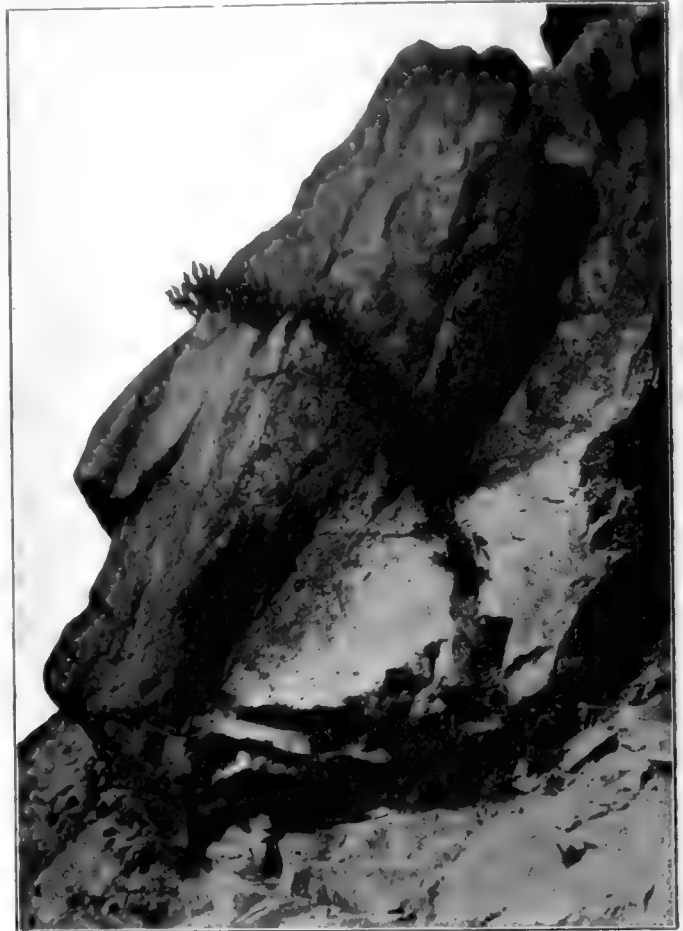
THE LASSEN VOLCANIC NATIONAL PARK

THE Lassen Volcanic National Park, the bill creating which President Wilson has signed, is California's fourth national park. Lassen Peak, which showed volcanic activity only a few years ago, was set apart as a national monument in 1906. Cinder Cone, in its immediate neighborhood, was also thus distinguished at the same time. The new national park includes both of these remarkable volcanic monuments within its area of 82,880 acres.

The region is one of extraordinary interest and the only one in the United States exhibiting recent volcanic action. Among its features are Lassen Peak, 10,437 feet elevation and still exhibiting some volcanic activity; North Peak, 8,600 feet elevation; Southwest Peak, over 9,200 feet elevation; Prospect Peak, over 9,200 feet elevation; Cinder Cone, 6,907 feet elevation; the Devil's Half Acre, showing hot springs and mud geysers; Bumpass, Morgan and other hot springs; seven lakes, many interesting ice caves and lakes of volcanic glass, numerous trout streams; and beautiful and majestic canyons. There are forests of yellow pine, fir, white pine, and lodgepole.

ROCK PROFILE OF WASHINGTON

THE illustration of a profile of George Washington seen in the gorge of the Natural Bridge of Virginia and published in *AMERICAN FORESTRY* for May has brought to *AMERICAN FORESTRY* photographs and stories



ROCK PROFILE OF GEORGE WASHINGTON

of several other profiles of the Father of his country formed by some scenic feature.

Among the most interesting of these is the accompanying picture of one of the best of the rock profiles of George Washington. It was sent to *AMERICAN FORESTRY* by Dr. Henry Sturgis Drinker, President of Lehigh University, who was for three years President, and is now a director, of the American Forestry Association. The rock is in the Lehigh University Park.

SHOE-BLACKING owes its peculiar aromatic odor, faintly suggestive of the deep woods where spruce or hemlock needles pad the ground, to an oil which is manufactured from these same kinds of needles. Similar oils are obtained from the foliage and small twigs of various cone-bearing trees, and find use for a number of purposes. In Europe the finer of these oils are used extensively as perfume in soap. They are common components of liniments and other medicinal preparations. Cedar oil is chiefly used in the preparation of insecticides, and, to some extent, in making liniment.

The Peak of Mount Russell

BY MARK DANIELS

WE camped one night at Crab Tree Meadow. The air was crisp, and toward morning was cold enough to send little stinging needles through any part of the anatomy which might be protruding from beneath covers.

There was no indication of the likelihood of a mountain shower or thunder-storm on the sparkling morning which followed. As a result we all started early on a trip to scale Mt. Whitney, the highest peak in the United States.

About a half hour after we reached the summit, the storm clouds began to gather, and those of us who knew that the signs were portentous, immediately started a hasty descent. We were not quick enough, however, and were caught in a hail storm that bid fair to crush us to the ground.

Upon our departure from Crab Tree Meadow the little brook which traverses the open glade was but eight or ten feet in width. Upon our return it had swollen to fifty or sixty feet in width and to an unknown depth. The latter, however, we fathomed when we crossed it to reach our camp. With the sheer perversity of dumb things, the storm passed immediately we had reached our camp-fire and the sun, just setting, broke clear and bright through the clouds.

We were nearly frozen and as drenched as water-

dogs. It can be imagined, therefore, with what avidity we partook of a hot toddy and with what little care for the magnificent scene about us we went about drying our clothes as best we could. Some of us were partly clad,

standing before a roaring fire and drying out what clothes we had, and our attention was entirely centered upon the work in hand.

Just before the sun was setting, however, one of the party glanced up and saw the peak of Mt. Russell illuminated with the golden rays of the setting sun. His exclamation diverted the attention of everyone and the scene which confronted us was one the glory of which drove all thoughts of discomfort from our minds.

The ridges in the foreground were in shadow and of a dark purple hue. The peak of Mt. Russell, seen in the distance, seemed to be of beaten gold, bathed as it was in the gold of the setting sun, whose rays struck it through another gorge behind the purple crags in the

foreground. It was like a monster nugget of pure gold framed in a setting of huge amethysts. We stood there spellbound until the last rays of the dying light disappeared with a suddenness that was like the snapping off of a dream of fairy-land, and returned to find that our roaring bonfire had paled to the dim glow of a firefly by comparison.



Photograph by Mark Daniels.

THE PEAK OF MOUNT RUSSELL

The Peak is seen in the far background. In the foreground is Crab Tree Meadow and the scene is one of the many beauty-spots in the Southern Sierra.

Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

EDITED BY J. J. LEVISON, B.A., M.F.

City Forester of New York City

WHAT WE CAN DO FOR OUR TREES IN WINTER

THE general feeling that one can do very little work on our trees during the winter is all wrong. One charged with the care of trees in a park, on city streets, or on a private estate, can do for them in late fall and winter almost as much as during any other period of the year and in special cases even more.

Let us see how this works out. When we deal with groups of trees, woodland groves or avenues lined with trees, we generally find some specimens badly infected with destructive bark beetles, borers and fungus diseases. If the trees that are hopelessly infected are marked (painting the trunk with white paint is a convenient way of marking) before the leaves drop, and removed and burnt before the following spring, the danger of infecting the neighboring sound trees during the spring and early summer is entirely eliminated.

In New York State, for instance, we are seriously troubled with the hickory bark beetle attacking the hickories, with the two-lined chestnut borer attacking oaks, and with the bronze birch borer on the birches. The removal of the branches and trees infested with these insects before May would eliminate the pests from the premises.

When trees die from old age, or from some special local cause, it is advantageous to postpone the removal of these until the winter.

Suppose your trees are infested with caterpillars, let us say the well-known Tussock moth, or the Gypsy moth, during the summer months. If so, you will find that these insects produce conspicuous clusters of eggs which adhere to the trunks and branches of the trees all fall and winter. Each of these egg clusters will produce hundreds of caterpillars if allowed to remain undisturbed after May. Is it not, then, preferable to fight our prospective crops of caterpillars by destroying in the winter time the egg masses which produce them? The egg clusters can be picked off or scraped off on canvas or paper covers spread on the ground and then collected and burned. The application of creosote to the egg clusters will also destroy them.

This is not all we can do in our dormant season. In the late fall we can fertilize the weaker trees, the shrubbery beds and the rare specimen trees with well-rotted manure. The manure should be dug in and mixed with the soil and should be concentrated near the tips of the roots rather than near the main trunk. A thorough fertilization of the trees in this manner will invigorate the trees and keep the tree doctor away.

The ideal material for invigorating trees in the manner just described is a compost consisting of manure, leaves and soil. Now is the time to form the compost and this will add another important undertaking for the late fall. The leaves raked from the lawns should not be burned. They should be collected and spread out on the compost pile. A layer of manure should be placed on top of the layer of leaves and a layer of soil over the manure. The process can be repeated several times until a suitable heap is formed. The compost heap may then be watered down thoroughly and turned over several times during the year. The material at the end of the year will be thoroughly decomposed and ready for use. Provision should also be made to draw off the surplus liquid manure so that it will not be wasted.

To those who still feel that they will not have enough work to keep them busy during the cold season, let me add such important items as cleaning out all cavities and decayed wounds of the trees and covering the exposed wood with coal tar. This is a necessary work wherever old trees exist, and one which can be done just as effectively in winter as in summer. If you have woodland to care for, there is plenty of opportunity to thin out the overcrowded trees, giving more growing space and light to the better species.

There is also room, in the winter time, for removing useless suckers from the old chestnut stumps and for encouraging the young seedlings in competition with others of lesser value. In face of these numerous undertakings that one can resort to during cold weather, there surely is no reason for the owner of trees to say that he cannot do effective work and equally as much in winter as in summer.

LANDSCAPE FORESTRY

R. B. MAXWELL, M. F., City Forester of Baltimore, Maryland, contributes to this department the following interesting defense of landscape forestry. He says:

"Is there such a profession as Landscape Forestry, or is the term a misnomer? Those of us who are arborists and landscape foresters believe that the science exists, but how are we to prove this, and to defend it against the attacks of those critics who claim the work to be a part of Landscape Gardening?"

"As I see it, landscape forestry is forestry having as its aim the propagation and maintenance of woodlands

from the æsthetic viewpoint, rather than from the viewpoint of the commercial forester. It may very properly be included as a part of the broad science of Landscape Architecture. No less authority than the late Charles Eliot includes under landscape architecture the following branches:

"1. Landscape Gardening, that part of the general art dealing with improvement of the property immediately adjacent to the house. It includes lawn building, work with single trees, shrubbery, flowers, etc.

"2. Landscape Engineering, that part of the general art dealing with the proper and most pleasing location of roads, paths, bridges, water bodies, etc. The actual building of these may also be a part of landscape engineering.

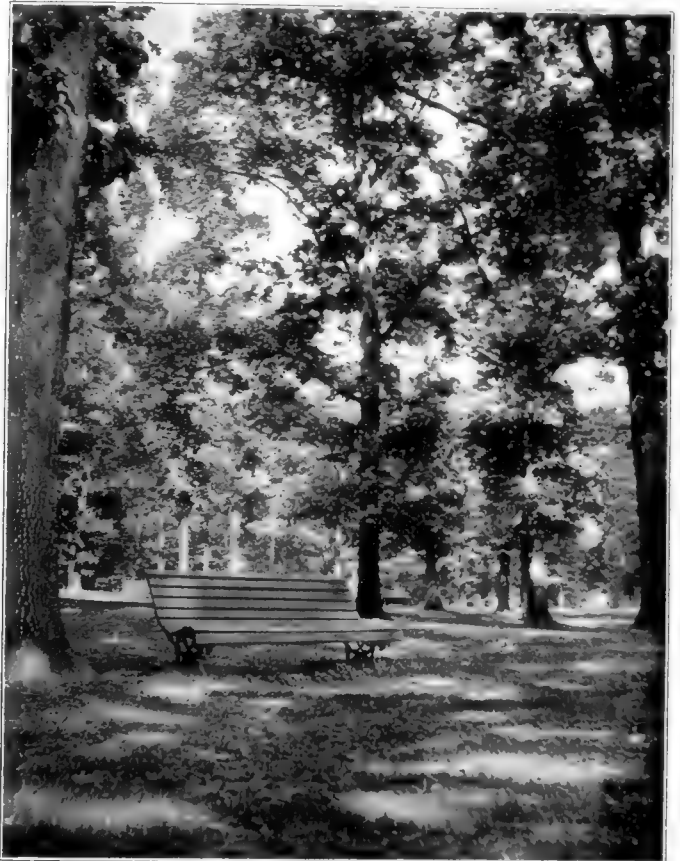


Photograph by F. W. Besley.

THINNED FOR SCENIC VALUE

A stand of beech almost pure. This woodland has been thinned and improved, but not from the viewpoint of commercial forestry. An operation of this kind should properly be classed as landscape forestry.

"What shall we call the art which directs the opening of tree-clogged views, or valleys? Surely some special knowledge of tree growth, habits, etc., is essential for this. It is hardly 'gardening.' Landscape gardening is not the science which directs the making of pleasant groves with turf-covered floors from the densest woodlands. Without a knowledge of thinnings, and the effect of changed light and moisture conditions, this operation would be a failure. The creating of an open 'park' within a forest cannot be attempted without considering



Photograph by R. B. Maxwell.

TYPE OF LANDSCAPE FORESTRY

This white oak grove, with its turf-covered floor, is the result of careful and judicious thinning. This is the remnant of a woodland, and is an example of what should be called landscape forestry.

"3. Landscape Forestry, that part of the general art dealing with the woodlands from the artistic viewpoint.

"It is not difficult to demonstrate that next to the topography itself, no feature of nature has such a decided influence upon landscapes as trees in woodlands. To prove this, let us consider flat and mountainous countries respectively, with, and without trees. The former without trees would be very uninteresting, the latter might be imposing, but hardly beautiful without tree-growth. Our critics will then say that true forestry is what we should practise. That is not true, for the commercial forester does not care whether his trees are spire-topped or round-headed. He does not care for foliage effects, or the presence of attractive tree flowers or fruits. In a well-ordered commercial forest, the forest floor is usually bare, and the tree trunks are tall branchless columns in tiresome repetition. In the commercial forest, the aim is for a full stand, and no gaps will be tolerated. The reverse of all of this is true with landscape forestry.

the effect of this operation upon the adjacent remaining growth. Is this knowledge landscape gardening? Path and road building may be considered a part of landscape architecture, but when done in a forest it has a closer relation to the subject of forestry than to the gardening branch. If we could consider the drainage of a forest without reference to the effect upon the forest growth the problem would be one of engineering pure and simple. Water levels and moisture conditions cannot be abruptly changed in this manner without seriously affecting the distribution of plant colonies. This is landscape forestry and in no way related to landscape gardening. What directs the leaving or introduction of red and sugar maples, viburnums, wild cherries, and sassafras, on a sunny woodland border? These trees are not all desirable from the viewpoint of true forestry. Landscape gardening has little to do with encouraging dogwood, hemlock, and other

tolerant species in woodlands, or the planting of moist, low areas with the sweet bay or liquidambar.

"Probably no features add more charm to a woodland than streams and lakes. Streams must be properly directed, however, and formed into pools and spills. Their margins must be carefully treated with shade-loving 'woody' plants. Is this landscape gardening? The creating of a lake may flood an area and destroy trees. This condition must be considered and planting done to meet the changed water conditions. This is not landscape gardening.

"The use of trees for 'planting out' unsightly objects has long been a trick of landscaping. Where a large body

of woodland is needed for this purpose, however, the operation becomes landscape forestry. The same holds true for the 'planting in' of pleasant prospects. The treatment of woodland areas to encourage or discourage true woodland flowers is a part of our work. Some of these flowers, which are at home in the forest, but usually out of place in a garden or on a lawn, are: Hepatica, trillium, Solomon's seal, anemone, blood-root, partridge berry, azalea, rhododendron, and mountain laurel.

"With these considerations in mind, I trust we have established landscape forestry as a distinct profession entirely divorced from landscape gardening or other allied branches."

ADVICE FOR NOVEMBER

Advice upon what to do for shade trees and shrubs during November, sent by the American Forestry Association to its members, and available for any applicant for advice is as follows:

1. Prune trees and remove the dead branches.
2. Do whatever fall spraying may be necessary to overcome sucking or scale insects.
3. Prepare a compost of leaf mold in a mixture with manure and soil. This compost will prove of great value

in all planting and gardening work on your premises, as well as in rejuvenating impoverished specimen trees.

4. Prune the roots of trees which are to be moved during the winter; cut around the base of the tree and fill the trench with straw.

5. In especially exposed places, protect the rhododendrons and other tender plants and shrubs with evergreen boughs. Do this only where the cold and exposure make it absolutely necessary.

QUESTIONS AND ANSWERS

Q. Could you give me the name and a little information concerning the tree producing the enclosed leaf? The tree is growing in sandy soil in an excavation made for an aqueduct near my home in Aqueduct, New York. The enclosed is a comparatively small leaf, the tree producing much larger. The tree seems to be about four or five years old, and is perhaps three inches in diameter at the base. I have not seen any other tree of a like nature in the locality, hence my interest in the matter.

E. L. P., *Aqueduct, New York.*

A. The tree is of the variety *Paulownia imperiales*, or Empress of Japan. It is similar in leaf and flower to the catalpa, introduced into this country from China and Japan, and named for Anna Paulowna, a Russian princess, daughter of Czar Paul I. It occurs through southern New York and New Jersey, but is hardy as far north as New York City.

Q. I am enclosing a specimen of moss or scale from three species of the trees on our place that we prize most, viz., the red oak, wild olive and walnut. We have about five walnut trees, twelve large wild olives and four large red oaks in which we are seriously interested. A local, rather well-known expert in such matters predicts the death of all our large trees within five years, unless the scale is gotten rid of. After examination, if you can suggest a remedy it will surely be appreciated.

R. W. H., *Savannah, Georgia.*

A. With reference to your inquiry, I have a report from our expert on the specimens which you sent me, and I am glad to be able to tell you that it is of the foliose lichens. Neither it nor the moss you sent is parasitic, and the only known effect they may have on the tree would be a smothering effect. Neither is as likely to have as smothering an effect as the so-called Spanish moss, which does not seem to be concerned in this case. The most that you need to fear is a slight reduction in the vigor of the trees, and even this is not to be expected unless the moss is present in great quantity in the top of the trees as well as on the trunk

Q. Being a member of the Association and a careful reader of the magazine, I wish to ask you concerning a maple tree which is in front of my house. I am enclosing a small sketch showing the elevation. My house is about six or eight feet above the state road, and between the first and second banking there is a large maple tree which shows signs of dying. The tree is directly to the north of the house and misses a lot of the sunshine, and also it is so placed on the banking that most of the rain water drains down into the road. What would you advise doing to prolong the life of this tree as it is a very valuable one to me?

R. M. M., *Webster, Massachusetts.*

A. I am much interested in your description of your maple tree and its location, and am glad to give you the best advice I can as to its care. Would suggest, first of all, a deep fertilization with well-rotted manure. Dig a trench around the tree about three or four feet away from the trunk. The trench should be three feet wide and two feet deep. Fill this trench with well-rotted manure mixed with good dark soil, half in half. In addition to this it is also well to vein the manure in narrow lines radiating from the trunk of the tree to the trench. In this way most of the roots will be fertilized and the ends of the roots will terminate in a rich mass of manured soil. The object of this work is not only to enrich the soil and the production of new and larger roots, but also to form a mulch which will retain the water and prevent it from draining to the road. Leaf mold, in combination with the manure, will help this mulching property. The running off of the water to the road may also be stopped by mixing considerable clay with the soil on that side of the tree which faces the road.

The following is quoted from a letter received from one of our readers:

"I have just been reading with considerable interest, your article in the July AMERICAN FORESTRY on Municipal Planting of Shade Trees. It seems to me that no one could find fault with

your conclusions, though, as a nurseryman, I might think that government competition with private business is not altogether fair. Surely there should be uniformity in street planting; my own street, with a mixture of sugar and Norway maples, elms and even Carolina poplars, is an example of the tree-seller's misguided efforts and the buyer's ignorance, while the gymnocladus in front of my own place, planted by a former owner, cause me daily to regret what I might have had. The bad effects of individual plantings have called for city action forbidding the planting of certain varieties.

"Recently, I read in one of the florist papers a correspondent's report from St. Louis that the Board of Aldermen of that city had passed an ordinance authorizing the city forester to designate streets requiring shade trees; to buy them and have them planted; the cost to be assessed as taxes against the owners of the abutting property. If true, that is rather advanced legislation, but very sensible, too. It is putting the matter of health and comfort from street shade trees in the same catalogue with lighting and paving and side-walks; and why not?"

"Do you know if this is correct as reported, and do you know of any other cities doing the same thing?"

A. In making the suggestions to which he refers we were naturally speaking of conditions as they practically exist in a great many cities all over the country, and were recommending that cities specialize in trees such as oriental planes and maples, which they constantly need for replenishing their streets, and were not recommending that cities go into the nursery business with the idea of raising ornamental stock which requires a great deal of special care. We think that our cities ought to buy most of that stock, but we can see no harm in their raising such trees as we mention. In fact, we do not see how you can stop them, because they are already doing it to a great extent. One thing we can help a great deal is the close coöperation between city foresters and nursery men. As to the shade tree ordinance which you speak of, there is nothing new in that, and such cities as Newark, and East Orange, New Jersey, and 50 others throughout the country have done that years ago. We shall be glad, however, to have expressions of opinion on these points from other interested readers.—*The Editor.*

Q. I lost two large trees that had been bearing large, fine dark blue plums. I do not know the name of the variety. A dark, hard and warty growth appeared on the branches. It spread so far and fast, and filled and withered the branches and leaves to such an extent that I had to cut them down. I burnt them up for fear of the infection spreading. I find I have been a bit late in this, for on examination I see it exists to some extent on some of my other plum trees of Japanese variety. I am told the disease is called the black knot, but I should like to have full information as to what it is, how to check it where now existing, how to prevent its spreading, if it is necessary to disinfect and treat the soil, and I desire particularly to know if the pruning, if advisable, is to be done at once or when the trees have shed their leaves. At the latter time it, of course, is more apparent and a better and cleaner job can be done. I am sending specimens.

E. K., *Little Boar's Head, New Hampshire.*

A. The disease is the regular black knot of the plum, as you thought. It is caused by the fungus *Plowrightia morbosa*. New infections take place in the spring and early summer, and the knots continue to grow throughout the growing period of the tree. By examination with a hand-lens, you will note that the surface of these knots is covered with innumerable round, blackish bodies, the fruiting bodies of the fungus. These, however, do not mature their spores until March of the following season. The work of eradication, therefore, can proceed at any time when convenient between now and next March, preferably after the leaves are off. On the larger limbs and branches make the cuts at least four to six inches below the knots, as the mycelium of the fungus extends a short distance beyond the swellings. It is a good plan to burn up the knots and then in bad cases to spray the trees with Bordeaux mixture before the buds swell.

Q. I am having at the moment great trouble with our pine trees. They have been perfectly healthy but are turning yellow, several have died already—all within the last month—four have gone entirely and others look "sick." There are no wild currant, or gooseberry bushes near the trees. They are quite large trees. As the chestnuts died, we replaced them with pines, spruce, larch and maples, all of which trees do well here. We have many fine old hemlocks.

A. With further reference to your pine trees, I am able to tell you the opinion the laboratory has expressed relative to the condition. Judging from the specimens, it seems that this is a physiological trouble, probably caused by extreme weather conditions last winter, which have affected a small part of the sap-wood through which the water is conducted from the roots upwards to the leaves. The hot, relatively dry weather which we have had recently has resulted in a greatly increased demand by the leaves for water. Until this time, the sap-wood, only a part of which is affected, has been able to supply sufficient water, but this sudden, much increased demand has been greater than the diseased wood could supply. The result is a partial shortage among the branches, with the scorching appearing very suddenly. This is the way I have figured out the whole trouble from the appearance of sap-wood and all the other circumstances. It is a matter which is, at least with our present facilities, not possible for us to definitely prove by experiment. We believe, however, this is the truth of the matter. Records kept for several years upon diseased trees showed that most of them recovered the second year, and that only a relatively few died from the effects. So far as we can judge, there is no treatment which is likely to aid this trouble.

Q. Two of my Norway maples have died all of a sudden this fall. All the neighboring trees of the same variety are in good condition. I do not know how to account for it except that I placed some cotton dipped in kerosene around the trunk last spring and repeated it several times. My intention was to ward off caterpillars.

H. M., *Hempstead, Long Island.*

A. A continuous application of kerosene to the bark of trees is likely to do serious injury.

Q. What is the best way to seed a steep bank and what grass shall I use for my lawn?

A. L., *New York City, New York.*

A. If the bank is very steep, the safest way is to use sod instead of seed, or else it will wash down before the seed is established. For the lawn the best seed would be a combination of equal parts of fescue, Kentucky blue and creeping bent. You might also introduce a very small quantity of small-leaf white clover.

Q. My hickory trees have turned brown within the past few weeks and many of them look entirely dead. Can you account for it? Will they come back again next year?

W. S., *Waterbury, Connecticut.*

A. Your hickories have evidently been killed this year by the hickory bark beetle. You should have that determined definitely, and, if so, the infested trees should be cut down and burnt before May. They will never come back to life.

Q. I want to set out some nice hybrid rhododendrons this fall. What are the best varieties?

R. H. L., *Orange, New Jersey.*

A. This is not the season for planting rhododendrons. Spring is the best time. The following varieties are good: Kettle drum, Abraham Lincoln, H. W. Sargent, General Grant, Everestrianum, Charles Dickens, Lady Armstrong, Parsons grandiflora, etc.

Across the High Sierras

By MARK DANIELS

FLORENCE PEAK is really the outpost on the trail across the high Sierra which marks the entrance to another land where proportions are strange and different. It is a mass of disintegrating granite about the base of which are rugged fields of talus and mile-long slopes of granite sand.

At its base nestles Franklin Lake, a sapphire sheet of crystal water fed by the melting snows on the north side of the peak.

The trail leading to Franklin Pass, which is to the left of the Peak, passes through some strange and weird scenes which are well calculated to put the traveler in the proper frame of mind for appreciating the scene from the summit. There are several groves of foxtail pine whose russet trunks and spectre-like branches, when silhouetted against the western sky, seem to speak of an austerity that shall fall upon him who travels their way, like the pall of a shroud. The entire landscape above the timber

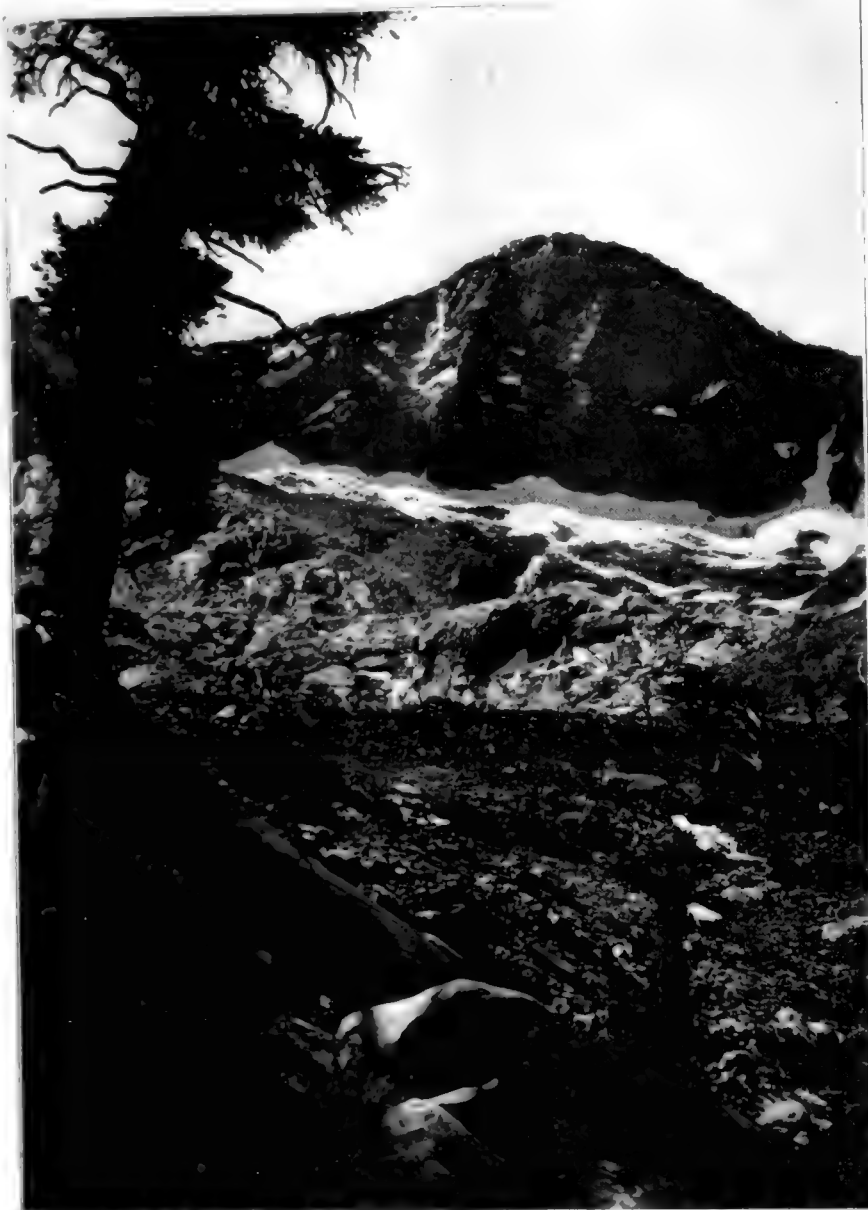
line is one of magnificent desolation and tremendous distances. From the summit at the Pass, the Great Western Divide bursts upon the view with shocking suddenness, and beyond it can be seen the real divide which constitutes the crest of the high Sierra. There are few passes in the

western mountains from which so commanding a view can be had as from Franklin Pass on the northern shoulder of Florence Peak.

The district surrounding Florence Peak is exposed and barren granite which reflects the light in all directions. If one is to travel for any length of time in this kind of country dark glasses are almost as necessary as in traversing snow-fields. John Muir named the Sierra Nevada "The Range of Light." He was prompted to do so by the strange diffused light that is ever present in the daytime in districts similar to the Florence Peak country. The face of the cliff shown in the picture is in deep shadow, yet there is sufficient diffused light to bring out all of the detail on a photographic plate.

The trail swings off to the northeast from Franklin Pass and traverses several miles of shifting, coarse, granite sand before it drops into the head-waters of Rattlesnake Creek.

From the latter point on, until the break of the Great Kern River Canyon is reached, the trail lies between towering walls of granite almost identical in character to the north side of Florence Peak, and even in the shadows beneath the trees, the amount of diffused light is quite apparent.



Photograph by Mark Daniels.

FLORENCE PEAK ON THE GREAT WESTERN DIVIDE

It is a bit confusing to find this peak and adjacent ones named as part of the Great Western Divide, but that is what they were called before the higher crests of the Sierra Nevada were discovered.

Do Ants Kill Trees About Their Colonies?

BY R. C. HAWLEY AND S. J. RECORD

DURING the past few years the writers have had occasion to note the death of young trees in the vicinity of ant hills. As the type of injury is practically the same in every case, and has never been found except in association with ant colonies, it is assumed that the ants are responsible, directly or indirectly, for the damage. Observations have been made on more

than sixty ant hills about New Haven, Ansonia, Middlebury, Union and other parts of Connecticut and in Pike County, Pennsylvania. The same trouble has been reported from other portions of Pennsylvania, Massachusetts, New Hampshire and New York.

The insect in question was, in all cases but one, the mound-building red ant, *Formica exsectoides* Forel. The



KILLED BY ANTS

Section through a young white pine showing girdling due to the ants and continued growth above it. Most of the dead bark covering the injured portion was broken off in handling specimen.



FORTY TREE CASUALTIES AROUND AN ANT HILL

Around the ant hill seen in the photograph, and located near New Haven, Connecticut, forty white pine trees have been killed or injured.

apparent exception was one low, flat mound in which the only ants observed were the common black, *Formica fusca* Linn. var. *subsericea* Say. Since, however, the red ant is parasitic on the black, it is not improbable that even in this case the red ant was responsible for the damage done. This view is strengthened by the fact that inspection of a considerable number of other black ant nests has revealed none of the characteristic injury to tree growth. In a few cases colonies of a dark-colored aphid tended by ants were found on trees near the red ant nests.

Most of the damage noted has been to white pine (*Pinus strobus*), from a few to fifteen years of age. Other species observed by the writers to have been affected were Scotch pine (*Pinus sylvestris*), red cedar (*Juniperus virginiana*), American aspen (*Populus tremuloides*), shag-bark hickory (*Hicoria ovata*), gray birch (*Betula populifolia*), Bear oak (*Quercus nana*), and Staghorn sumach (*Rhus hirta*). The effects are most noticeable in pine plantations and in openings in the high forest where young trees are coming in.

The areas of infection are irregularly circular, and the radius within which trees are damaged about each ant hill is subject to considerable variation, reaching a maximum of 25 feet, with an average possibly of about 10 feet. The largest number of trees noted, killed or attacked about a single colony, was 40. Where ants are abundant the loss may be very considerable. In one white pine plantation of about a quarter acre near Union, Connecticut, fully

75 per cent of all the trees had been killed. Since these ants are common throughout the northeastern United States, particularly on the class of lands ordinarily reforested, the importance of the danger is evident.

In the case of white pines the injury is first manifested by a slight yellowing of the foliage which gradually increases until the tree dies and the leaves turn brown. Examination of a dying or recently dead tree shows a constriction of the trunk extending from 1 to



No. 1.

No. 2.

No. 1.—Young white pine, near New Haven, Connecticut, showing characteristic constriction just above ground line which is indicated by the upper edge of ruler.

No. 2.—Young Scotch pine, near New Haven, Connecticut, killed near ant hill, showing prominently the callus and increased growth above injury.

5 inches just above the ground line and with a decided swelling at the upper margin. Upon removal of the bark, the cambium layer is found to be girdled as by a canker, while the swelling above the injury is due to callous and continued growth of the stem in diameter for two years or so after growth below ceased. Above the seat of principal injury is to be found a considerable number of small depressions in the bark which extend up the trunk from a few inches to two feet or more. On living trees ants have frequently been observed about fresh injuries to the green bark. These patches later develop a corky layer and produce the characteristic dark pits referred to above. Instances have been observed where partially girdled trees have recovered.

The conclusions to be drawn are therefore:

1. The ants are responsible¹ for the death of the trees, as in no instance has this particular trouble been observed except in the immediate vicinity of ant colonies. It appears to the advantage of the ants to kill vegetation which otherwise would shade the colonies too much. The damage is most noticeable in plantations presumably because ants are most abundant in open areas.

¹ This conclusion is drawn in spite of the fact that ants have not previously been considered enemies of trees. Heretofore they have been classed as beneficial on account of destroying large numbers of insects.

2. The immediate cause of the death of the trees is not yet understood. Dr. A. H. Graves² believed it to be due to a fungus, but was unable to substantiate this belief. Inoculation of healthy trees produced only negative results. No fruiting bodies on the injured areas have been observed by the writers, and the range of species attacked seems too great for a single fungous disease. If fungi or bacteria are responsible, the only plausible means of dissemination is through the agency of the ants. There is no evidence that the damage spreads from tree to tree.

3. From the appearance of the specimens examined by the writers, the death of the trees is not attributable to mechanical injury to the bark from the biting of the ants, as there are no evidences of girdling from the outside. That the trouble is not due to soil-poisoning or damage to the roots is indicated by the nature of the injury and its localization.

4. The only apparent means of combating the trouble is to destroy the ant colonies. Experiments are now in progress to determine the best means of accomplishing this. Carbon disulphide and naphthalene flakes may prove efficacious if properly administered. In order to avoid loss of young trees, the work of extermination should be done prior to planting. Otherwise it is advisable to leave unplanted a circle at least 20 feet in radius about each colony of *Formica exsectoides*.

DOUGLAS RODMAN DEAD

Douglas Rodman, a well-known forester, died suddenly of heart failure in Butte, Montana, on July 6th and was buried at Frankfort, Kentucky, the city where he was born on March 22, 1882. After preparatory schooling in Kentucky, he studied under Dr. Schenck at Biltmore, graduated there and entered the Forest Service. His first detail was to Manitou Islands, after which Mr. Pinchot sent him as ranger to the Gila Forest Reserve in New Mexico. Here his energy and ability were soon recognized. He was made assistant forester and then chief forester over this difficult and large reserve, and finally succeeded to such an extent as to secure Mr. Pinchot's high commendation. Mr. Rodman resigned from the Forest Service to make general forestry and mining investigations in the Pacific Coast states and Alaska. He was for several years in charge of forest engineering for the C. A. Smith Company at Marshfield, Oregon, introducing scientific forestry into this large operation. Mr. Rodman was a man of high enthusiasms and warm friendships. In his wide traveling and experience he made many friends over the country who will grieve at his death while still in his active years.

THIRTY-SEVENTH ANNUAL MEETING

The 37th annual meeting of the American Forestry Association will be held at Washington, D. C., on Thursday and Friday, January 18 and 19, 1917. All members are urged to attend. The program will be announced later.

² A preliminary note on a new bark disease of the white pine *Mycologia*, vol. vi, No. 2, March, 1914.

A New Method of Germinating Acorns for Forest Planting

By JOHN W. HARSHBERGER, *University of Pennsylvania*

THE trained forester is always alive to new methods by which the objects of his profession may be reached by the easiest and most satisfactory methods. An important question to the forester is the collection, preservation and germination of the fruits and seeds collected by him to establish his forest nursery, and the methods adopted by him toward this end have been elaborated in great detail. The proper preservation of nuts, acorns, other seeds and fruits over winter has always been a difficult matter, for the germination of the seeds must be kept unimpaired during the cold and frosty period of the year.

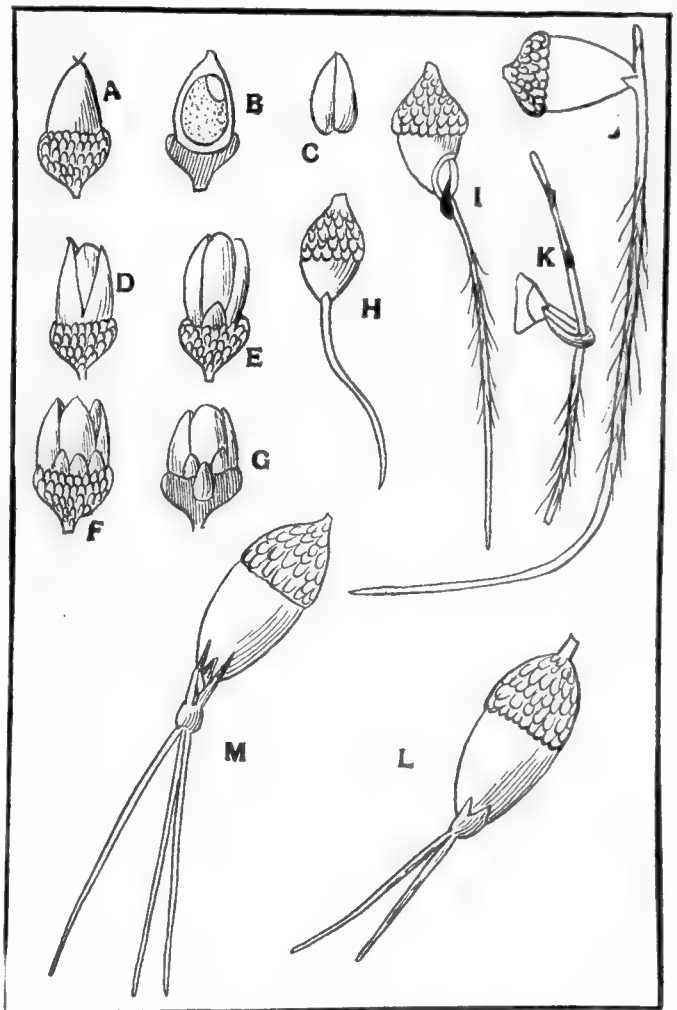
A new method of treating one class of these fruits, acorns, was discovered in an accidental way by the writer about two years ago, and a description of the method may prove of interest to the readers of *AMERICAN FORESTRY*. In order to acquaint myself with the method used by the Pennsylvania forester, I wrote to Professor Joseph T. Rothrock, of West Chester, asking him what method he had used in the preservation of acorns over winter. In reply he stated that his observations had been made on a scale of but a few thousand.

His method was as follows: ordinary strawberry boxes were taken, holding one quart, and the acorns to be kept over winter were placed in them, layers of almost dry earth alternating with layers of acorns, until the boxes were filled. These strawberry boxes, filled with acorns and earth, were then put in a larger box, so that the smaller boxes were piled one above the other. Over the retaining box, a still larger box was turned upside down as a cover, and over these boxes earth was shoveled until they were entirely covered, so as to keep out rain and cold. This cache was then opened in the spring and the sprouting acorns were removed and planted. Dr. Rothrock also described a method of planting the acorns in the fall, covering them with a layer of leaves, and just enough earth to keep the leaves from blowing away. This should be done in well-prepared ground, so that the seedlings can make a rapid growth in the spring.

Guppy, an English botanist, has demonstrated that the acorns of the red oak actually germinated on the tree, thus showing vivipary, and this growth continued on the tree after the pericarp, or fruit case, had commenced to dry and lose weight. He demonstrated that ripe acorns are able to proceed at once to germination, if placed under conditions inhibiting the glazing of the fruit wall and the drying of the fruit. On September 17, 1908, he collected ripe acorns and placed them in damp moss in a warm cupboard. They were still biologically connected with their cupules, and their shells, though beginning to brown, were still thick and moist. Within eight days he found

some of them germinating normally, and one of them, when planted, grew healthily under protection during winter. He repeated this experiment with green, ripe acorns, showing no signs of dying, and possessing, as in the first case, entire shells. In five days half of them had split their shells and in several the radicle protruded.

After having read this account, the writer found, on



A. Acorn of Black Jack oak. B. Acorn of Black Jack oak dissected. C. Embryo Black Jack oak. D. First stage of vivipary in acorn of Black Jack oak. E, F, G. Later stages of vivipary. H, I. Stages in germination of green acorns of Black Jack oak. J. Stage in germination of green acorn of white oak. K. Detail of the germination of the acorn of white oak. L, M. Germination of green unripe acorns of white oak.

September 5, 1912, a viviparous acorn at Spring Lake, New Jersey, on the Black Jack oak. This state was probably induced by preceding heavy rains, followed by mists and fogs. The examination of this acorn (Figs. A-G inclusive) showed that the embryo had swollen sufficiently to crack open the acorn wall. This suggested experiments with a number of acorns from American oaks to test the discoveries of Guppy with reference to the germina-

tion of the English oak. Acorns from the white oak, chestnut oak, and blackjack oak were planted in a box in sphagnum moss on September 12, 1912, and the results recorded on October 22, 1912. Two series of green acorns were sown. One set had a portion of the shell removed, exposing the embryo. The other set was planted with the acorn shells unimpaired. There was a slight advantage in the rate of germination of the cut acorns, as contrasted with the uncut. Practically all of the green acorns of the chestnut oak, blackjack oak and white oak germinated without passing through a dormant period. In fact, the dormant period is not necessary for acorn germination, although Sachs¹ has maintained that even under the most favorable conditions dormant periods occur in the lives of plants and although the external factors are favorable, every extremely perceptible vital manifestation ceases, and it is only after more months of rest that the growth commences anew, and this frequently under circumstances which appear far less favorable, especially at a conspicuously lower temperature. This has evidently been the philosophy under which foresters have layered their nuts and acorns for their preservation in a viable condition through the winter. The practice under these conditions has been described previously as practised by Dr. Rothrock.

The experiments narrated above show that a rest period is not essential for the germination of acorns, but that by taking immature acorns, whose embryo has not ceased to grow, and planting them, the period of growth is maintained without cessation, or without a rest period, and the result is the elongation and growth of the embryo into a young seedling plant, as fully demonstrated by the figures (H-M).

The germination capacity of so-called unripe seeds does not seem to have been appreciated by foresters and gardeners, who layer their tree seeds in boxes of sand, kept slightly moist, and kept in a cool, protected place over winter. That the acorns can be planted, while green, in protected frames and carried over the winter in the frame, or cool greenhouse, in the actively growing condition, and planted out in the spring, should be a boon to the forester, who has been troubled with the successful preservation of the acorns over winter. A practical trial of this new method on a large scale should be made at some forest station in the United States.

¹ Sachs, Julius, *The Physiology of Plants*, 350.

FUEL VALUE OF WOOD

THE fuel value of 2 pounds of wood is roughly equivalent to that of 1 pound of coal. This is given as the result of certain calculations now being made in the Forest Service laboratory, which show also about how many cords of certain kinds of wood are required to obtain an amount of heat equal to that in a ton of coal.

Certain kinds of wood, such as hickory, oak, beech, birch, hard maple, ash, elm, locust, longleaf pine, and

cherry, have fairly high heat values and only one cord of seasoned wood of these species is required to equal one ton of good coal.

It takes a cord and a half of shortleaf pine, hemlock, red gum, Douglas fir, sycamore, and soft maple to equal a ton of coal, and two cords of cedar, redwood, poplar, catalpa, Norway pine, cypress, basswood, spruce, and white pine.

Equal weights of dry, non-resinous woods, however, are said to have practically the same heat value regardless of species, and as a consequence it can be stated as a general proposition that the heavier the wood the more heat to the cord. Weight for weight, however, there is very little difference between various species; the average heat for all that have been calculated is 4600 calories, or heat units, per kilogram. A kilogram of resin will develop 9400 heat units, or about twice the average for wood. As a consequence, resinous woods have a greater heat value per pound than non-resinous woods, and this increased value varies, of course, with the resin content.

The available heat value of a cord of wood depends on many different factors. It has a relation not only to the amount of resin it contains but to the amount of moisture present. Furthermore, cords vary as to the amount of solid wood they contain, even when they are of the standard dimension and occupy 128 cubic feet of space. A certain proportion of this space is made up of air spaces between the sticks, and this air space may be considerable in a cord made of twisted, crooked, and knotty sticks. Out of the 128 cubic feet, a fair average of solid wood is about 80 cubic feet.

It is pointed out, however, that heat value is not the only test of usefulness in fuel wood and since 95 per cent of all wood used for fuel is consumed for domestic purposes, largely in farm houses, such factors as rapidity of burning and ease of lighting are important. Each section of the country has its favored woods and these are said to be, in general, the right ones to use. Hickory, of the non-resinous woods, has the highest fuel value per unit volume of wood, and has other advantages. It burns evenly, and, as housewives say, holds the heat. The oaks come next, followed by beech, birch, and maple. Pine has a relatively low heat value per unit volume, but has other advantages. It ignites readily and gives out a quick, hot flame, but one that soon dies down. This makes it a favorite with rural housekeepers as a summer wood, because it is particularly adapted for hot days in the kitchen.

The fuel qualities of chestnut adapt it particularly to work in brass foundries, where it gives just the required amount of heat and it is therefore in favor. Coastwise vessels in Florida pay twice as much for Florida buttonwood as for any other, because it burns with an even heat and with a minimum amount of smoke and ash.

The principal disadvantage of the resinous pines is their oily black smoke.

Editorial

THE TOWN FOREST

TEN years ago the idea of municipalities acquiring and managing forest land would have been greeted with derision or rejected as unpractical. To-day the policy is widely recognized, and, in at least one state, Massachusetts, an active campaign is being waged to secure the establishment of a town forest by every city, town and village.

The most fundamental use to which a town forest can be put is that of recreation. The ideas of our city and town dwellers are outgrowing the narrow and artificial confines of highly developed city parks, with their well-kept lawns, flower beds and shrubbery. These will continue to be the lungs of the city, for those who can spare a few moments for rest, and as a demonstration of man's improvements on nature.

But the spirit of our pioneer ancestry is strong within us. We long for a tramp in the wild woods, a view of nature in the rough. The great majority of us are without the leisure or the means of gratifying this instinct by extensive trips. A Saturday half-holiday, or part of a Sunday, for a trolley ride to some nearby point is the best we can do. What do we find? A dusty road, fringed with "No Trespass" signs, reinforced by belligerent property owners or hired watchers with dogs.

More and more it is becoming a vital necessity for communities to take into their own hands the responsibility for providing forest land free to the public. The essentials of a town forest, as distinguished from a city park, are larger areas, somewhat remote, though easy of access, on which improvements are confined to the construction of trails or roads, with a few essential structures to increase the comfort of the visitor. No attempt should be made to artificialize or "beautify" the forest, but the tract should be under a forester's care. The dead and dying trees should be marked, thus providing employment especially

during periods of labor surplus. The young crowded stands should be thinned and made vigorous. Waste areas—and of these there is only too great an abundance—should be planted. It may be possible to use dependent, pauper or convict labor on this great work for the public good. The more beautiful and accessible groves of mature trees—where a town is fortunate enough to secure such groves—should be preserved with care. The enjoyment derived by the public is worth far more than the commercial value of the timber. Much judicious cutting can be done, however, on portions of the area, for the purpose of renewing and building up the forest.

It has been argued that our municipalities are so corruptly governed that they are unfit for such responsibilities. Has this argument ever prevented the public from taking steps to secure the vitally essential city parks? And have not these parks been placed for the most part in the hands of boards composed of the best and most disinterested citizens? Have we any reason to suppose that the same keen and universal interest which has driven corruption and party politics out of our city park administration will not be equally effective in protecting the town forests?

Furthermore, the means is at hand and the procedure clearly shown by which this result can be secured. The employment of a trained forester who has also mastered the technic of landscape architecture, and the placing of this work under a board similar to the park boards, or even under the park boards themselves, will guarantee the success of the work.

It is time that every American municipality, large or small, should bestir itself in this matter. In no other way can equal benefit of so permanent a character be secured. Town forests must come, and come to stay.

THE PROTECTION OF BIG GAME

THE pioneer period in this country's development, when the good of all was best furthered by the unrestrained initiative of the individual, is passing and we are witnessing the dawn of a new era of intelligent commercial supervision and adjustment. This is nowhere shown so strikingly as in the handling of the problems of protection for big game animals. The frontier heroes—Boone, Crockett, Bowie and their associates—were primarily hunters. The squirrel rifle, with which feats of astonishing skill were performed, was the most useful implement of husbandry. The settler, clearing a home in the trackless forest, would many times have been forced to give up the desperate struggle for a living had

it not been for the abundance of wild game and fish, both large and small, with which he eked out his living and supported his family. The tradition that game is legitimate meat for the pioneer is still strong in newly settled regions, despite laws seeking to limit the killing and preserve the remnants of our wild life.

But with the demarcation of agricultural areas and the permanent segregation of true forest soils unfit for farming, came a change in the underlying economic situation. The increasing interest in big game hunting as a sport and the growing desire of the entire nation for the preservation and increase of these species of animals, the possibility of whose complete extinction has been so

thoroughly demonstrated in the case of the buffalo, have led to the widespread consideration of practical measures for protection.

This first took the form of game laws limiting the hunting seasons, restricting the size of the bag, and forbidding commercial trafficking in game animals and birds. But with the growing army of hunters, the restriction of the native ranges, and the continued inefficacy of administration, animal and bird life continued to shrink at an appalling rate. Lately a new and more promising line of effort has been inaugurated, in the form of refuges or sanctuaries, where the harried remnant of our wild creatures may grow and multiply, secure in the protection of their overlords, who hold for them the power of life or death.

The greatest of these refuges is that established in and surrounding the Yellowstone National Park, where the American elk, largest of our deer species, may be seen in herds numbering thousands.

One of the most remarkable phenomena of these refuges is the swift adaptation shown by the wild creatures, and the almost complete disappearance of that timidity upon which they formerly depended for their very existence. Even the wild fowl, mallards and geese, retaining their wariness during migration, learn that they are safe in certain places and permit the approach of their human enemies on protected lakes.

The administration of these refuges for big grazing animals like the elk demands constant and intelligent

supervision. With the destruction of predatory carnivorous animals, the elk soon increase, even to the point where there is insufficient forage and starvation thins the herds. Winter grazing is impossible on high slopes, and the carrying capacity is limited to the number which can survive the winter on such low lands or valleys as are still open to them. Here they conflict with the encroaching settlers on agricultural lands, and it is now necessary for the Government to purchase hay to preserve some herds from extermination during this period. The elk, of course, consume forage that would otherwise be available for sheep and cattle.

Elk grazing, then, becomes as much of a science as the raising of sheep, and any attempt to overlook this fact will result in repeated tragedies. The overlords must care for their subjects, who can shift for themselves only within the inexorable laws of food supply imposed by natural conditions.

There is but one efficient method of administering so vital and complex a problem. The National Government, upon whose lands, park and forest these game refuges for elk have been established, should have complete control of the herds, determine their grazing limits, the number which may annually be killed from the natural increase, and supervise the activities of hunters. *The illegal activities of tusk hunters must cease.* The states must unite, for the common good, in permitting the nation to exercise unrestricted control over national game refuges.

INDIANA'S NEED—A TRAINED STATE FORESTER

THE time has gone by in this country when state forestry work requiring trained supervision can be successfully directed by persons appointed for political reasons and lacking the training requisite to fitness for the office. Indiana alone of all the Eastern States still adheres to this plan. The present state forester had no education in his subject at a professional forest school, and his acquaintance with his duties is such as he has been able to absorb after his appointment. This means education at the expense of the state. Even with the best intentions on the part of the forester, such a system cannot recommend itself to the taxpayers of Indiana, and should the incumbent prove indifferent to his responsibilities and regard his salary as a reward for political services previously given, rather than payment for duty to be performed, the system breaks down completely.

Minnesota, which permits the State Forestry Board to appoint its own executive forester, secured a graduate of the State Forestry College and has retained him ever since 1911. Wisconsin has had a trained forester since 1904. Michigan state forestry work has been in the hands of a trained man since 1899, the present state forester being a graduate of a forest school.

Kentucky in establishing its State Forestry Department in 1912 prescribed in the law that the forester must

be a technically trained man. A graduate of a forest school was appointed and has been recently reappointed for four years.

Six Southern States have established forestry departments and in every instance have insisted upon the appointment of trained men as state foresters. Forest school graduates are in charge of the State work in Vermont, New Hampshire, Connecticut, New York, New Jersey, and Pennsylvania. Practically all states which have forestry departments at all have insisted that foresters shall be employed by the state instead of politicians to run the department.

The State Forestry Board of Indiana was created in 1903, but the law which established the Board made it impossible for the Board ever to do effective work by depriving it of the power to appoint its secretary or state forester.

As a result not a single appointee to this office in the last fourteen years has had any technical equipment for his work, and the system is a failure. Indiana must change her forestry law and give to the State Forestry Board the power to appoint a technically trained and scientifically equipped state forester. A continuance of the present policy means lack of progress in forestry in the State.

Teachers Commend American Forestry

"I am very much pleased with AMERICAN FORESTRY. It will serve a valuable purpose in several of our classes, and I am glad that we may profit by this addition to our teaching equipment."

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"I am sure our students, through the perusal of this excellent magazine, will evidence greater interest in the preservation of trees and tree life."

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Asst. to Principal, Germantown High
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I. E. STETLER, *Supervising Principal,*
Samuel B. Huey Public School, Phila., Pa.

"AMERICAN FORESTRY finds interested readers here, for we have in the school a forestry chapter of our Nature Club which is doing good work in interesting other students in the care and conservation of trees."

KATHARINE E. PUNCHEON, *Principal,*
Philadelphia High School for Girls,
Phila., Pa.

Mr. Beede Made Secretary

Mr. Victor A. Beede, Assistant State Forester of New Hampshire, has been elected Executive Secretary of the New York State Forestry Association, with headquarters at the Chamber of Commerce Building, Syracuse, New York. Mr. Beede is a graduate of Yale University, the Yale Forest School, and has had considerable experience along forestry lines. Following his graduation he visited France, Germany and Switzerland, and observed his forest practice in those countries. He has served as Forester and Assistant Secretary of the Massachusetts Forestry Association and as Forest Assistant on the Pike National Forest in Colorado. Mr. Beede will take up his new position on November 1st.

Book News

Seeding and Planting in the Practice of Forestry, by James W. Toumey, M.D., M.A., 454 pages, cloth \$3.50. John Wiley & Sons, Inc., New York City. Prof. Toumey is director of the Forest School and Professor of Silviculture at Yale University.

This book presents both the details of practice and the fundamental principles that control success and failure in the economic production of nursery stock and the artificial regeneration of forests. It explains the *why* as well as the *how*. The author states in his preface: "The practitioner must have a clear appreciation of underlying principles or he cannot be safely trusted to direct the details of nursery practice, seeding and planting. He must have a broad knowledge of methods and tools in order that he may attain successful regeneration at the least cost." Almost without exception, the cultural methods described and the tools and machines figured have been used by the author, or the results of the work observed by him in this country or abroad. Part I of the book deals with the silvical basis for seeding and planting, more particularly the principles which underlie the choice of species, the closeness of spacing and the composition of the stand. Part II is descriptive of the various operations in artificial regeneration and the results that may be expected from the best practice.

A Correction

On page 420 of the July number of AMERICAN FORESTRY there appears a series of questions under the title of "Advice for Many Here." J. S. Illick, acting director of the State Forest Academy at Mont Alto, Pennsylvania, takes exception to the following from the answer to question 3: "The Balsam Fir is native to the Adirondack Mountain section, but not in Pennsylvania." Mr. Illick says: "The latter part of this statement is not correct. The Balsam Fir (*Abies balsamea*) is native to the counties of Pike, Monroe, Sullivan, Lycoming, Clinton, Tioga, McKean, and Center, in the State of Pennsylvania. Its distribution is local, but in the well watered portions, especially swamps, of the above-named counties the tree is quite common. In the Bear Meadow region of Center County it covers a considerable area, and about the many lakes in Pike and Monroe Counties it is found rather abundant. Furthermore, it even extends along the Allegheny Mountains to Virginia."

Pine for Kraft Paper

Experiments with jack pine have shown that it is well suited for making kraft paper. On some of the National Forests this tree is used to plant land which is too poor to grow other timber.

Canadian Department

BY ELLWOOD WILSON

*Secretary, Canadian Society of Forest
Engineers*

On the eighteenth of September Mr. Clyde Leavitt, Forester to the Dominion Railway Commission, and Mr. Robson Black, Secretary of the Canadian Forestry Association, and the writer made an inspection trip along the line of the National Transcontinental Railway, operated by the Quebec Government, from La Tuque, which is about 200 miles northwest of Quebec, to Amos, a newly settled town not far from the Ontario line, the whole distance covered being about 300 miles. The trip was made on a motor speeder and was under the guidance of Mr. Henry Sorgius, Manager of the St. Maurice Forest Protective Association.

From La Tuque to Parent the country is mostly of the hardwood spruce, balsam type, and has been pretty well lumbered, and was largely burned when construction commenced, until a cooperative association was formed to protect the limits along the right-of-way. From Parent west to Nottaway is almost all of the jack pine-white birch type and from Nottaway west to the Ontario boundary the soil is clayey and covered with dense stands of small black spruce, which rarely attains a greater diameter than eight inches at breast height.

From La Tuque to Nottaway the country is rocky and sandy and unfitted for anything but forest growth. From Nottaway west one is in the so-called clay belt, where the soil is good, the climate no more rigorous than in the district around Quebec City, and in which in time a prosperous farming community should spring up, provided proper fire protection is furnished.

At Amos, a new town of about 300 people, boasting a church, several saw-mills, some stores and a hotel, and the residence of the local agent of the Department of Crown Lands, we met the Deputy Minister of Lands and Forests, Dr. Dechene, who was making an inspection trip through the district. Just beyond Amos is the internment camp of Austrians and Germans at Spirit Lake, where the interned aliens are engaged in clearing off the forests and making farms for settlers. The disastrous Ontario fire of last season swept almost over to this point, and in several of the Quebec villages houses and saw-mills were burned.

The trip showed us the absolute need of patrol on the line of the railroad beyond the territory patrolled by the St. Maurice

Forest Protective Association. In its territory there have been no large fires for four years and the result is very marked. The country is green and the young growth is doing well. The section from La Tuque to Nottaway, about two hundred and fifty miles, should on no account be settled, for there is practically no agricultural soil, but should be set aside as a forest reserve.

Mr. Roy Campbell has lately returned from Europe, where he went with a government commission to inspect conditions in that unhappy country. He said the point which interested him most was the evidence of forest management in the mountainous region inland from Bordeaux and Limoges, a high plateau of sandy country, with patches of managed forests of from a hundred to a couple of thousand acres, and showing us the way in which things should be handled in this country. Throughout this region cutting had quite evidently been accelerated on account of the demand for posts for use in the trenches. Everything was cut from five inches upwards and the largest trees were ten inches on the stump. The litter was carefully cleared up and the small branches piled to be used for fuel. The durability of the oak floors in the old houses was also noted; some of these had been down for a couple of hundred years and still retained their beauty. In England the extensive use of creosoted wood was noted, and the railroad ties were larger and longer and seemed good for at least ten years' longer service than with us.

The forest survey of New Brunswick is, under Mr. P. Z. Caverhill, progressing favorably, about 200,000 acres having been covered to date, and some of the maps are nearly completed. A couple of points have presented themselves which required immediate attention, such as the examination of licensed lands for the cutting of undersized trees for pulp, examination of areas for settlement purposes; in one case 4000 acres had to be examined. The result of this work was so satisfactory that the Premier has ordered a soil-type map to be made of the whole forest area, which will be invaluable in the opening of lands for settlement. The Premier has made an inspection trip of some of the work and has taken a great interest in it. The question of a better system of fire protection will come up soon and New Brunswick will soon have a record to be proud of.

Mr. B. K. Ayres, of the Canadian Society of Forest Engineers, is moving shortly from Ansonia, Connecticut, where he has been with the Ansonia Forest Products Company, to Concord, New Hampshire, where he will operate on his own timber lands.

Mr. H. G. Schanche who has been with the Laurentide Company, Limited, and is now finishing his forestry work at Pennsylvania State College, has been elected an Associate Member of the Canadian Society of Forest Engineers.

M. A. Grainger, Acting Chief Forester, who outlined briefly the scope of the British Columbia Forest Branch and its relation to the lumber industry, and H. R. MacMillan, who tendered evidence concerning the export position as affecting the British Columbia lumber industry, were among the witnesses examined by the Dominion Royal Commission during its sittings at Victoria, September 20-22.

Mr. H. R. MacMillan, who for the last year and a half has been engaged in a study of the lumber export markets of the world, for the Dominion Department of Trade and Commerce, has tendered his resignation as Chief Forester to the Hon. W. R. Ross, Minister of Lands, in order to accept a position with the Victoria Lumber and Manufacturing Company, of Chemainus, British Columbia. Mr. MacMillan was one of the first Canadians to take up forestry as a profession, and has been prominently identified with the forestry movement in Canada for almost ten years, first in the Dominion Forestry Branch, and, since 1912, with the British Columbia Forest Service. His former and present associates will keenly regret Mr. MacMillan's decision to sever his connection with the governmental forestry work, but wish him all success in his new position.

Dr. H. N. Whitford and Mr. Roland D. Craig, having completed their report to the Commission of Conservation concerning the area of merchantable timber in British Columbia, in which work they have had the cooperation of the Provincial Forest Service, have now left the province, the former to take up a position in the Forest School, Yale University, and the latter having gone to Ottawa.

Mr. Louis B. Beale, Lumber Commissioner for British Columbia, stationed at Toronto, has returned to Victoria for consultation with the Forest Branch, and the lumber manufacturers, concerning the future development of that important work. The British Columbia Lumber Exhibit, under Mr. Beale's management at the recent Canadian National Exhibition, attracted notable attention, and as evidence of the growing interest in the Eastern market for British Columbia woods, it may be mentioned that during the first two or three days over 3000 samples of wood were taken away by persons interested, and hundreds

entered their names to receive further information, etc.

The active service list of members of the British Columbia Forest Branch continues to grow, and to date 68 have enlisted, in addition to 47 forest guards. Messrs. Mitchell and Rees have won the Military Cross.

White pine blister rust has been reported around Montreal and Mr. G. C. Piché, Chief Forester of Quebec, is taking measures to ascertain the extent of the disease.

Hon. Jules Allard, Minister of Lands and Forests of Quebec, and Mr. G. C. Piché will pay a visit to the nurseries and plantations of the Laurentide Company, Limited. They will also inspect the power plants at Shawinigan Falls and the Quebec Government Nurseries at Berthierville.

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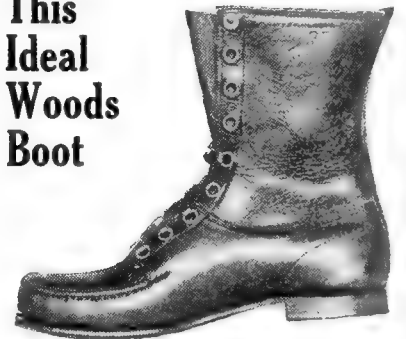
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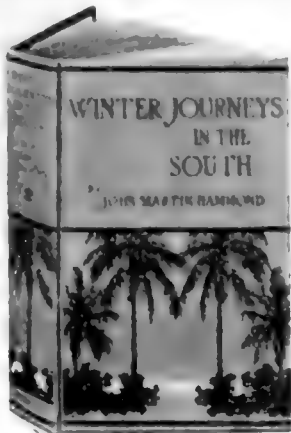
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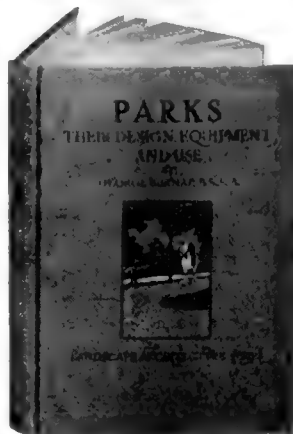
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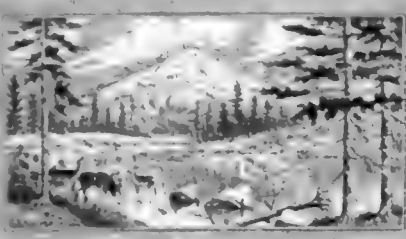
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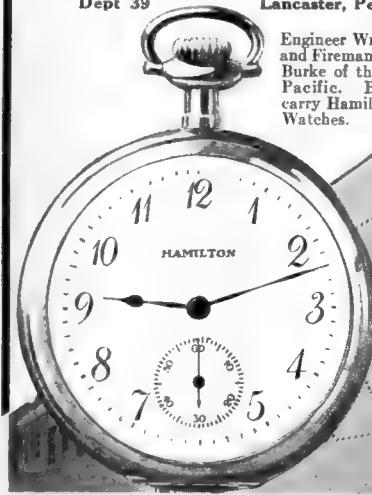
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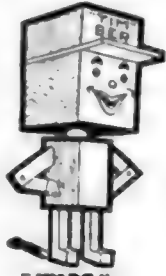
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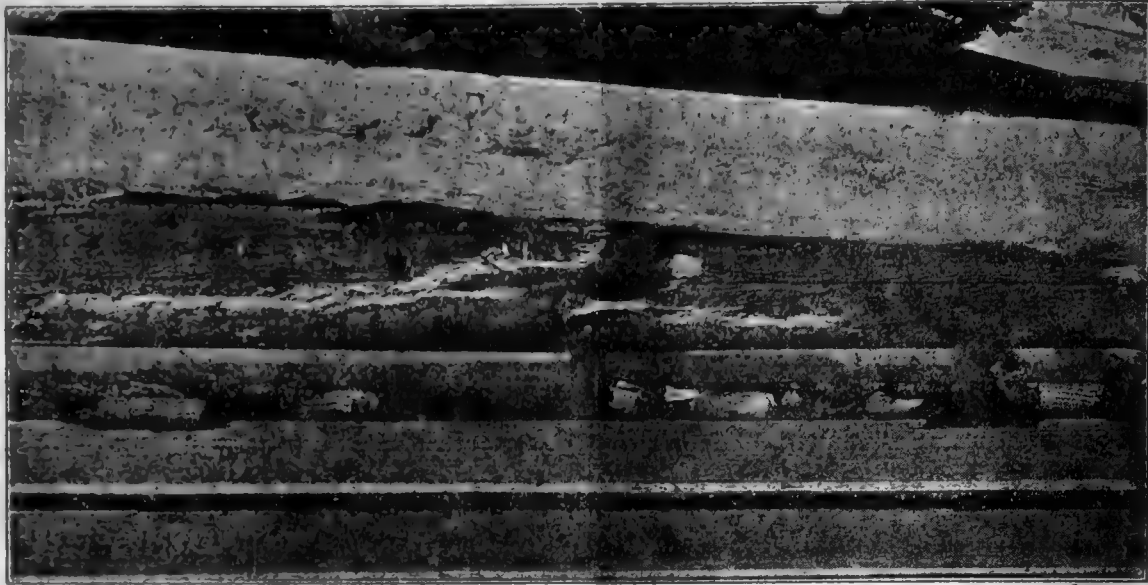
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American Forestry



An Illustrated Magazine about Forestry and Kindred Subjects Published Each Month by the American Forestry Association Washington, D.C.



Decayed Lumber in a Corn Crib (Courtesy U. S. Forest Service)

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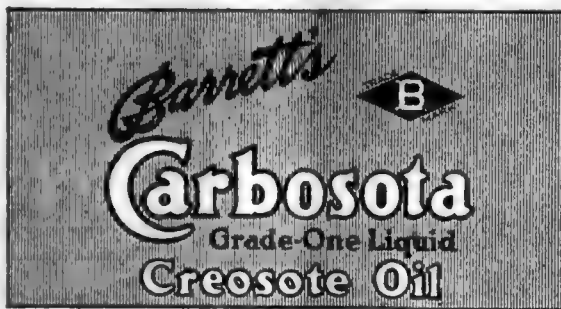
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The Magazine of the American Forestry Association

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DECEMBER 1916. VOL. 22

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AMERICAN FORESTRY

VOL. XXII

DECEMBER 1916

No. 276

The Red Spruce

Identification and Characteristics

By P. L. BUTTRICK

THE naming of almost any section of our country brings to mind some particular tree, nowhere more than in the Northeast where the tree is spruce. The association is so close that the forester calls the region the "Spruce Northeast," but to most it is known as the "North Woods"—a storied land so graphically described by a host of writers from Henry David Thoreau to Doctor Van Dyke. This northern forest stretches across the continent from the Maritime Provinces of Canada to Alaska. In the United States it is confined to northern and eastern Maine, northern New Hampshire and Vermont, the Adirondack Mountains of New York, and a broken and disconnected strip along the high summits of the Appalachians to North Carolina.

There are forests more impressive by their regularity and the size of their trees than the spruce forest of the Northeast. For sheer grandeur it is not to be compared with the great forests of the Pacific Coast, or even the white pine stands of the Lake States. It lacks the spaciousness and openness of the longleaf pine barrens of the South, or the quiet beauty and intimacy of the eastern hardwood forests. Yet it has a beauty and fascination of its own. To many it is the most beautiful of forests. It casts its fascination over all who visit its shades. The lakes of Maine, the White Mountains of New Hampshire, and the Adirondacks are among the oldest and best known vacation grounds in America.

There are three species

of spruce found in the United States, three of them being found in the region. They are named, as is so common in the case of trees, after certain colors. In this case white, black and red. The white spruce (*Picea canadensis*) is so called because of its grayish white bark. It occurs sparingly along the northern borders of the United States and the Black Hills of South Dakota. It is more characteristic of Canada than the United States and is found from Nova Scotia to Alaska and almost to the Arctic Ocean. It makes up the bulk of the vast spruce forests of Quebec and Ontario.

The white spruce is the largest and handsomest of the eastern spruces. It occasionally attains a height of 150 feet and a diameter of 3 or 4 feet. It has a narrow and symmetrical conical shaped crown, and is usually very beautiful. Because of the odor given off by its leaves when crushed it sometimes bears the more graphic than elegant title of skunk spruce.

The black spruce (*Picea mariana*) enjoys its name from the very dark cast to its leaves and occupies much the same range as the white, but is more common in the United States. It is a small and straggling tree, mostly confined to swamps and semi-barren hilltops. Its only value lies in the occasional specimens which happen to get large enough to be harvested with red or white spruce (*Picea rubens*). It is difficult for any but the expert to distinguish absolutely between these two trees, indeed for many years they were considered as one



BRANCH OF RED SPRUCE

The cones are from one and a quarter to two inches long and reddish brown. The needles are dark green to yellowish green.

species. It is not an important matter however.

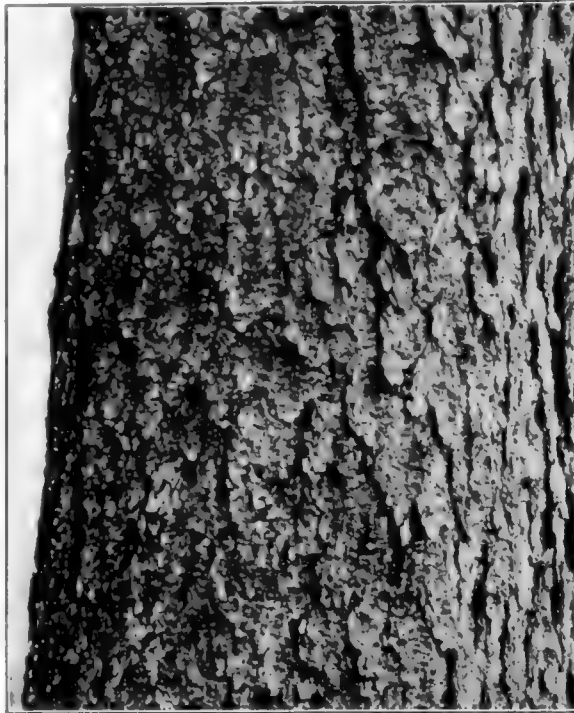
The red spruce, or *epinette rouge* of the French Canadians, seems to derive the descriptive part of its name from the reddish-brown cast to the bark of the mature tree, yet in the woods where it is common it is known simply as spruce, but the others are referred to by name. Its scientific name is the Latin equivalent of its English and French and is in no way remarkable. The tree is not noted for its great size, although it is far from a small tree. Specimens exceeding 100 feet in height are unusual and trunks 4 feet through are likewise rare. Trees in the forest average 2 feet in diameter and from 60 to 80 feet high. Mature red spruce has a rather open, wide spreading crown. It is composed of a few large, irregular branches which droop more or less, but are upturned toward their tips. The crown lacks the narrow conical aspect of white spruce, or the broad pyramidal effect of Norway spruce.

The red spruce has a much more restricted range than the others. The Maritime Provinces, Quebec, eastern Ontario and western New York State mark its northern and western boundaries. It extends further south, however, than the others, for it follows the higher summits of the Alleghenies and Appalachians clear to North Carolina, where it can be found growing within a few miles of the cotton fields and the vastly different flora of the southern forests. The black spruce also follows the mountains southward but to a lesser degree. Some botanists consider the spruce of the mountains another species, giving it the name of *Picea australis*; but the points of distinction between it and the common form, if they exist at all, are too microscopic to interest the forester greatly or the lumberman in the least.

The idea must not be gotten that a solid body of spruce is to be found along the tops of all the mountains in the Appalachian chain. It is only here and there on the summits of the highest peaks and ranges that they are found. Small bodies exist in the Poconos in northeast Pennsylvania and a few

tracts were until recently to be found in central Pennsylvania. West Virginia contains the largest bodies of any of the Appalachian States. In the eastern part of the State at elevations above 2400 feet originally there was a fine spruce forest covering about 1,500,000 acres.

So great have been the ravages of fire, insects, diseases and man that it is doubtful if 200,000 acres of this remain in virgin timber. A few mountain tops in Old Virginia are capped with spruce forests, but no considerable bodies occur. In North Carolina, where the Appalachians reach their greatest height the spruce forest makes its southernmost stand. It seldom occurs below 5000 feet. The best known area is the Black Mountains, the highest peak of which is Mount Mitchell, also the highest point in America east of the Mississippi River. The name Black Mountains was suggested by the dark color due to the dense masses of spruce on the summits. It was given to the range long before it was explored by Doctor Mitchell who



BARK OF RED SPRUCE

lost his life and left his name on its highest peak. The largest body of spruce is in the Great Smokies, the wildest and most remote mountain range in eastern America. Here above a belt of hardwoods, unsurpassed in the temperate zone, there extends a long band of magnificent spruce timber. Small bodies of spruce cling, like shipwrecked sailors to the masthead of a sinking vessel, to the summits of a few other scattered peaks.

Except on mountain tops or deep swamps, spruce seldom occurs pure over large areas. Its most common associates are hardwoods, beech, birch and maple being particularly common. The combinations of types and species in the spruce region are numerous and often bewildering.

Red spruce reverses the common characteristics of most trees and grows faster as it grows older. In youth it is one of the slowest growing trees we have. It remains of seedling or sapling size often for upwards of half a century, growing inconspicuously underneath the shade of other trees. Finally when they die or are cut and it receives an abundant supply of light, it



AREA OF RED SPRUCE GROWTH

suddenly increases in growth and adds to its height and becomes a full-grown tree. From then on its growth is regular and well sustained till old age. Native spruce requires a rotation of from 80 to 100 years, and most virgin spruce cut to-day is well over the century mark in age.

The spruces make desirable ornamental trees, but the red spruce is generally too slow growing for this purpose. The most common spruce seen in cultivation in the eastern United States is the Norway—an importation from Europe.

It has been estimated that the stand of the eastern spruces in the United States is 50,000,000,000 feet, 80 per cent of it being in northern New England and northeastern New York. Although no separate estimate for the red spruce is available, it is probable that 95 per cent of it is of this species. It is peculiar that the best spruce stands are found, not in the north, but in the Appalachian Mountains, those in West Virginia taking the palm. The average stand in Maine is about 3000 or 4000 feet to the acre, and the best stands seldom exceed 15,000

or 20,000 feet, while in West Virginia they often average 6000 feet and more, with maximums of 60,000. In North Carolina yields are not quite so high, but still in excess of those in the north. The reason seems to be that the trees grow thicker on the ground and are more often found in pure stands. Most of the spruce stumpage is controlled

by pulp and lumber interests.

The wood of the eastern spruces is so similar in character and appearance that it is exceedingly difficult to tell them apart. Nor is it generally important that they be distinguished from each other, since commercially they are all one. Superficially spruce wood resembles white pine, but there is no distinction between heart and sapwood and the color is apt to be even paler and more whitish. It never possesses the light reddish or rose colored cast common to the



MATURE SPRUCE STANDS IN THE ADIRONDACKS

Spruces generally grow mixed with hardwoods or other conifers, in this case with balsam fir which has formed a thick under-story. The fir is a less valuable tree than the spruces but is increasing in amount because it grows faster than the spruces and takes its place in the forest when the wood is cut.

latter. Spruce wood has no desirable figure, being one of the plainest and most homogeneous of our woods. Consequently it has no place as a cabinet or ornamental wood.

Commercial Uses of Red Spruce

SPRUCE was little used till the supply of pine began to decrease, when its better grades came into the market as a substitute for the pine. Although it now has an assured place of its own as a lumber wood and even has substitutes, chiefly balsam fir, it has never been pre-eminently noted as a lumber producer—not be-

cause of any lack of value and adaptability, but because it is of more value for something else—wood pulp, seventy per cent of the cut being used for this purpose. The spruces are the leading pulpwoods of the world and red spruce the leading pulpwood of the United States. About 70 per cent of the pulpwood used in

the United States is spruce, chiefly red spruce, the remainder being made from some 6 or 8 other species.

The most desirable qualities in a pulpwood are length and toughness of fiber. Long-fibered woods mat down



PILE OF FOUR-FOOT PULPWOOD FOR TRANSPORTATION TO THE PULP-MILLS

The chief use of spruce-wood is as a source of wood-pulp for paper. Seventy per cent of the paper manufactured in America is made from spruce-wood. The industry gives employment to thousands of men both in woods and mill. It is hoped that the present extraordinary demand for pulp and consequent high prices will not induce over-cutting of pulpwoods and consequent grave reduction of the future supply.

well into paper, and make strong paper. Likewise, strength and toughness of fiber make for strength and toughness of paper. There are woods having longer fibers than spruce, but when length and toughness are combined it is one of the leaders. Another desirable quality in a pulpwood is a light color. Red gum, a dark colored wood, makes an excellent pulp, but the cost of bleaching it is said to be prohibitive. Lastly, a pulpwood must be abundant and not too valuable for other use, else the pulp man cannot compete with the lumberman for it. Spruce meets all these requirements and is worthy of its rank as a leading pulpwood. Most of it is used for the manufacture of print papers, and the larger part of our newspapers are printed on paper made from spruce pulp. For newspaper it is common to mix sulphite or "chemical" pulp with ground wood, the former having more body and the latter being cheaper.

Spruce lumber can be used acceptably as a substitute for white pine in most cases. It is chiefly used for dimension timbers of small sizes, house frames, sash door, and blind manufacture, and box shooks. Because of its light weight and moderate strength it is a very desirable wood for framework and dimension lumber of smaller sizes, and possesses some advantages for these uses over stronger but heavier woods such as southern yellow pine and oak. Its weight is but little more than

half of oak and 35 per cent less than that of yellow pine. Spruce clapboards, side boards and other forms of lumber for exterior finish are also manufactured in considerable amounts, since spruce lasts well when exposed to the atmosphere. Most of the spruce lumber cut in New England, New York and the Maritime Provinces is sold along the seaboard, chiefly at Boston and New York. Much of it is shipped by water directly from mills located at tidewater in Maine and New Brunswick. A small amount also goes abroad from those localities, chiefly to Europe and the West Indies. West Virginia spruce is sold chiefly in and about Pittsburgh and Philadelphia.

Much spruce is sawed to order at the mills, dealers frequently sending in specifications as to size and length and receiving lumber all ready to be placed in building without the necessity of cutting it to length from standard sizes and wasting the trim.

Spruce has many uses aside from building purposes.



PULPWOOD ON THE BANKS OF STREAM IN NEW HAMPSHIRE

Most spruce is still cut in remote regions and driven down the streams to the pulp- or saw-mills. Four-foot spruce bolts are harder to drive than saw-logs.

It ranks high as a box wood and in the spruce region and the territory adjacent to it, which is one of the largest box making sections of the United States, spruce ranks second to white pine, which, as a box wood, is the leader for the whole country.

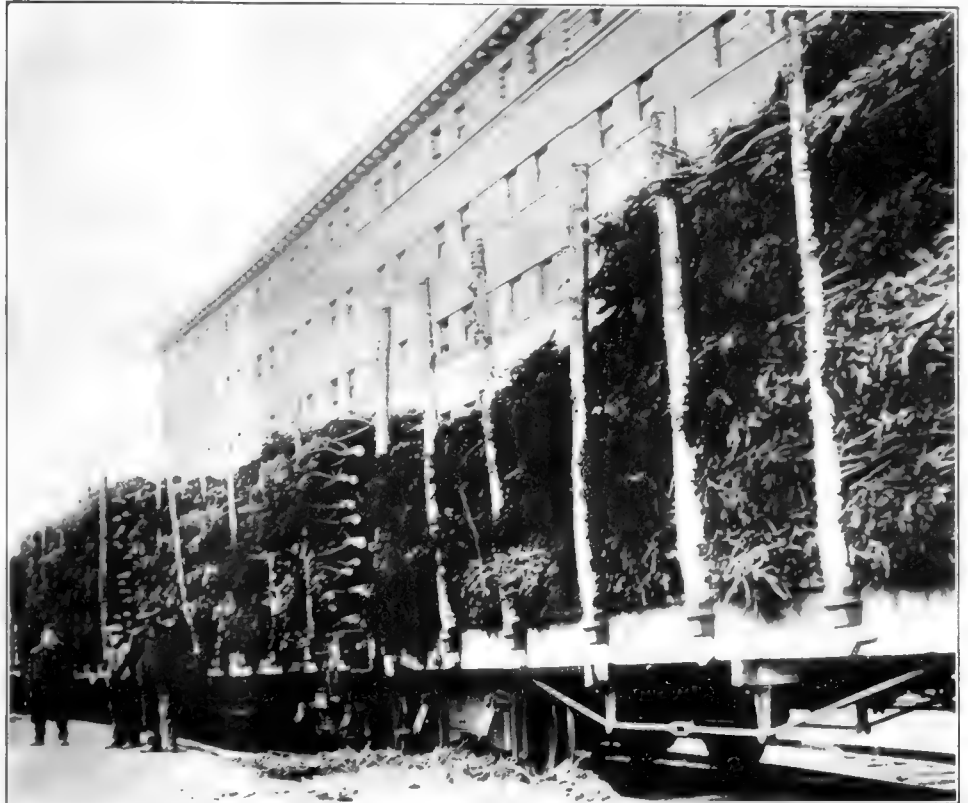
Musical instruments involving the principle of the sounding board, such as the violin and the piano, require wood of a highly resonant nature. For this spruce has no superior. The resonance of wood increases with its age, so the makers of violins take extraordinary precautions to obtain old, well-seasoned wood. Seven years is not too long for it to season for their purposes. Often they seek old beams, table tops, and other pieces which have been in service for many years, and collectors go where

old houses are being demolished in quest of such pieces.

There are hosts of uses for spruce in the various woodworking industries, all the way from ship building to the manufacture of wooden pie plates.

The use of young spruce trees along with the balsam fir for Christmas trees is well known. It was at one time thought that this business would put such a drain upon the reproduction in the forest that some of the states in the spruce region took steps to regulate it, but it seems evident now that the stock of young trees is not seriously depleted and the young trees bring more for this purpose than they would for many years if allowed to grow up for lumber or pulp.

A product of the spruce tree, better known once than now, is spruce gum. It is formed from the resinous exudations which take place at wounds and branch stubs. Formerly it was collected largely from the standing trees, but now most of it is ob-



A TRAIN LOAD OF CHRISTMAS TREES

Every year thousands of young spruce and fir trees are cut in the North Woods and shipped all over the eastern part of the United States to gladden the hearts of young and old at Christmas-tide. The balsam fir makes a somewhat prettier Christmas tree than the spruce and has a more pleasing odor, but very few can tell the difference. It was at one time thought that the indiscriminate cutting of young trees for Christmas trees was contrary to conservation principles and destructive to the forest, but it now seems evident that without a great extension of the business the loss is immaterial. The forest owner can obtain more for young trees as Christmas trees than their value for pulpwood or lumber at a greater age.



Photograph by P. L. Bultrick.

A WOOD FOREMAN IN THE SPRUCE WOODS

The success of a lumber camp depends upon the foreman. He is generally a Scotchman or a Yankee. He must have a large amount of technical knowledge at his command (learned from experience, not from books) and be able to handle men. This picture was taken before Mackinaw coats became popular in the cities, but they have been used in the North Woods for many years.

tained in the course of logging work from the felled trees. The gum is used in medicine as part of the ingredients of cough syrups and drops, and for chewing gum. It sells from 12½ cents to \$4.00 per pound, according to the grade. The state of Maine alone produces 150 tons annually, valued at \$300,000.

As to the amount of its cut, spruce ranks sixth on the list of American woods, between 3 and 4 per cent of the total lumber cut of the country being spruce. In 1912 the cut was 1,238,600,000 board feet.

At one time pine land sold for more if no spruce grew on it, but to-day spruce lands in Maine and the Adirondacks are worth more than they were when they were first logged for pine, and very little spruce stumpage is for sale. The 1915 prices for pulpwood stumpage were about as follows: In New York from \$3.50 to \$4 per cord; in Maine from \$4 to \$4.50 per cord. Saw timber in New Hampshire is worth from \$5.50 to \$6 per thousand; in West Virginia from \$4 to \$5 per thousand. These prices are higher, by the way, than for the southern pines which we ordinarily consider as more valuable woods. The prices for pulpwood ready for the mill vary from section to section. In North Carolina spruce pulpwood sells for \$6 per cord; in New Hampshire it averages over \$9 delivered at the mills.

1862.....	\$9.00 per M f. o. b. Boston
1870.....	16.00 per M f. o. b. Boston
1880.....	13.00 per M f. o. b. Boston
1890.....	13.00 per M f. o. b. Boston
1900.....	16.00 per M f. o. b. Boston
1904.....	16.00 per M f. o. b. Boston
1906.....	25.10 per M f. o. b. New York
1908.....	20.60 per M f. o. b. New York
1910.....	23.30 per M f. o. b. New York
1914.....	25.00 per M f. o. b. Boston

It is interesting to compare the prices of spruce for a series of years in order to observe the rise in value of this wood. Boston and New York are the chief spruce marketing points, and the wholesale prices quoted

Maine no longer could justly call herself the Pine Tree State. So the lumbermen turned their attention to the hitherto despised spruce. It was not till 1845 that spruce was cut and marketed and it was in 1861 that spruce first topped the pine in cut at Bangor and probably in the whole State. Since then, as the saying goes, "spruce is king."



A LOGGING CAMP IN THE SPRUCE REGION

The earliest camps were built of pine or spruce logs roofed with hand-split cedar shingles. Now camps are roofed with tar paper and are frequently made of hardwood logs or rough lumber. They are usually divided into three sections, a kitchen and dining-room, a bunk house and a barn. They are connected by covered passages called dingles.

in the foregoing table refer to one market or the other.

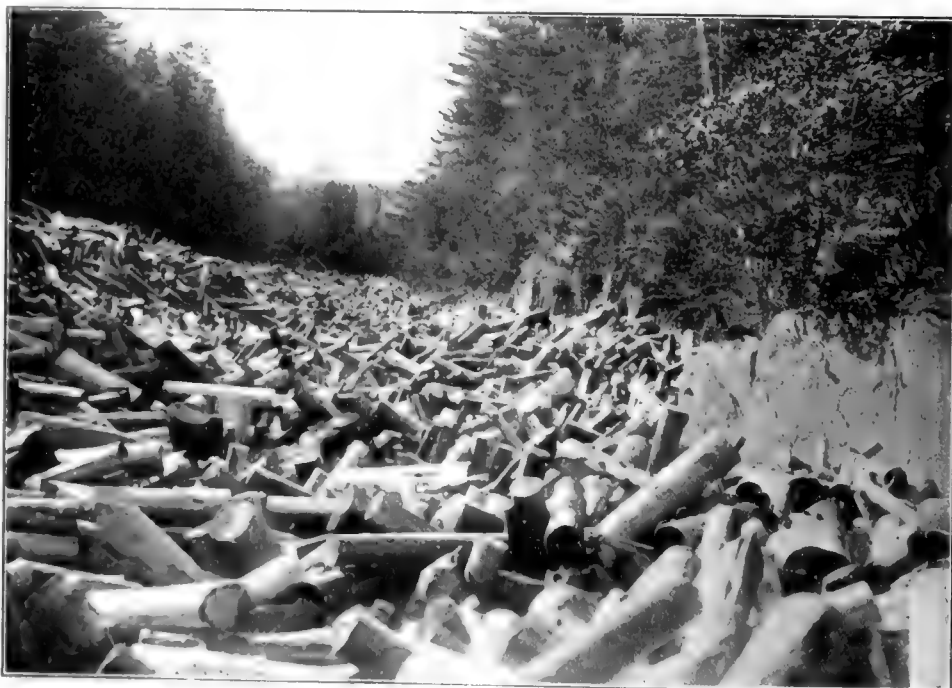
The English colonists came into contact with the spruce when settlements were made along the coast of Maine. They started to cut and export timber almost immediately, and here lumbering in America as an organized industry had its origin. It was in the forests of the Saco and Androscoggin river basins that snow-

logging and river driving were first developed (the earliest organized method of cutting and transporting large numbers of logs to a distant mill). It was here that the first saw mill in America was operated (at York, Maine, in 1623). Yet it was white pine rather than spruce which was sought. For more than 200 years spruce was not considered as a timber tree. As time went on loggers exhausted the pine lower down the streams and moved further and further back, the pine becoming less and less abundant and the spruce more and more. Then, when Maine and New York were

struggling for the title of leading state in lumber production, and Bangor was the leading lumber mart of the world, it was suddenly discovered that the pine was gone,

cattle for hauling logs, and in some places steam log haulers mounted on sleds and caterpillar tractors have partly displaced horses. Great improvements have been

As time has gone on newer systems of logging have been introduced in other sections. The logging railroad has largely supplanted the river for transporting logs. Steam skidders, haulers, and cableways have threatened the supremacy of animals in the woods. So the old-time system of logging developed at the edge of the spruce region now seems almost primitive, yet it is still the accepted method in that region, where it has been carried to a high state of efficiency. True, improvements have been introduced, saws have displaced axes for felling and cutting up timber, horses have largely displaced



A RED SPRUCE LOG JAM

Log driving is a hazardous business. If a few logs become caught on an obstruction in a stream the rest behind are apt to pile up and form a jam. Formerly jams were broken by loosening the logs with cant-hooks and many men were lost at the hazardous work. Now they are generally blown up with dynamite.

made in streams to facilitate driving, dams have been erected to regulate the flow of water, rocks have been blasted out to widen and deepen difficult channels, tele-

phone lines have been strung along the main branches of the streams to keep all points of the drive in touch. Tug boats have rendered unnecessary much of the old-time labor on headworks for getting logs across lakes.

The type of men, too, has changed. The original woodsmen were native Yankees, at first farmers who worked for a while in the woods in winter and for a while on the drive in spring, but they gradually gave way to the professional lumberjack who followed the woods regularly. He is as characteristic a type of our pioneer days as the cowboy—and as picturesque. Holmes Day in his "King Spruce" and some of his poems has given us graphic pictures of him in his native north woods, while Stewart Edward White has immortalized his immediate successor, the Michigan lumberjack, in his "Blazed Trail" and "The Riverman." The first foreigners in the region were French Canadians and natives of New Brunswick and Prince Edward Island—the latter derisively known as "P.I.S." All were accomplished woodsmen and accepted as such. Up to 10 years ago there were few Europeans, but now the Swede and the Pole, better known in the woods as the "Squarehead" and the "Polack," have secured a firm foothold, but the river drivers are still largely Americans and Canadian French.

Early in the fall, sometimes in midsummer, the logging crews seek the woods, generally far beyond the railroads and in an otherwise uninhabited country. Cut-

ting starts immediately unless a camp has to be built and roads constructed. The aim is to get the winter's cut finished by Christmas or the first of January, as generally the snow becomes too deep to do much after that. The logs are decked up in yards or skidways along the main roads as fast as they are cut, and when cutting ceases the roads are plowed out and iced so that the sleds will run easily. The logs are then loaded on the sleds and hauled to the landings at the edges of the streams or lakes and dumped to await the melting of the ice and the opening of the drive. The hauling off, as it is called, is the most exciting and strenuous part of the woods work. Oftentimes it is a race with the weather man, for to linger is to let the snow melt and leave the logs in the woods till the following winter. At such times all hands work twelve, sixteen, perhaps twenty hours a day, to get the logs landed "before she breaks up," and when the impossible has been accomplished and the last log is on the landing, the whole crew breaks camp amid melting snow and slush which mark the coming of spring. After a brief season in town, it is back to the woods when the drive starts. What tales have been told of the drives on the Penobscot, the Androscoggin, the Kennebec, the Connecticut and many other streams! There is scarcely a more romantic branch of all industry than log driving. Its greatest days have passed, but it will be many years before the last log goes down the West Branch and the stories of those which have will always be told.

PAPER MAKING POSSIBILITIES

OWING to the growing scarcity in Wisconsin of wood suitable for making paper pulp, the Forest Products Laboratory has just completed a study into the methods of barking, chipping, screening, and baling of chips. Laboratory tests show that certain western woods are admirably adapted for manufacture into pulp, and negotiations are now under way between paper companies in Wisconsin and western railroads with a view to securing freight rates on trainload shipments of chips to Wisconsin. It is estimated that some of these western woods can be cut into chips, which, when dried and baled, can be delivered to the mills in Wisconsin at a very small advance over the cost of chips made from local timbers. Since there is a market for more than 300,000 cords of wood annually in Wisconsin, an attempt to utilize western species appears worthy of consideration in order to hold the supply of wood for our American paper mills on American soil.

USING THE BARK OF TREES

THE Forest Products Laboratory experts, in their efforts to reduce the amount of waste in the lumber industry, have long declared that they have been able to utilize everything but the bark, just as the pork packer is said to market everything but the squeal of the hog.

Now they have even found a way to use the bark. By a new process, waste bark can be used to partially replace expensive rag stock in the manufacture of felt roofing, and is already being used commercially by mills coöperating with the laboratory experts. The bark thus used is that remaining after the extraction of the tannin for leather work, and the same waste bark has been used successfully for the making of a commercial wallpaper. Experiments now in progress indicate that the hemlock bark may be used for sheathing paper, carpet lining, bottle wrappers and deadening felt.

IN coöperation with the Post Office Department, the Pennsylvania Department of Forestry has prepared a big forest fire placard which will be placed in every post-office in Pennsylvania located in or near a forested area. An order has also been issued by the Postmaster General advising Pennsylvania post-masters that all rural mail carriers must report any forest fires they see to the nearest fire warden.

ALMOST eight million trees will be available for next spring's reforestation operations from the stock now in the Pennsylvania State Forest nurseries. This is an increase in production over last year of about thirty per cent, and is the largest number of seedlings ever grown in the nurseries. Last year private individuals planted 1,500,000 trees furnished by the Department.

Playgrounds on National Forests

A FEW years ago most of our citizens who professed interest in the National Forests viewed the subject from a purely utilitarian standpoint. Mention a National Forest and the discussion invariably turned to questions of lumbering, grazing, and water-power. In all such questions the public's attitude was largely impersonal and usually academic. To-day the National Forests of the West occupy an entirely different position in the public mind. They have become the property of the people in a sense so genuinely personal that the Forest Service, once the most bitterly assailed Bureau of the Government, has become one of the most popular.

What is the cause of this reversal of sentiment? It is due to the fact that the Forest Service has been for years steadily converting the local public from hostility or indifference to warm support because of the many benefits realized by the public from National Forest administration. Not the least of these is the use of the National Forests for recreational purposes.

A provision in the Congressional enactments of 1915, extending the authority of the Forest Service to permit the leasing of lands suitably located within National Forests in five-acre tracts for a period of not exceeding thirty years, to individuals or associations for use as summer homes, and for the erection of hotels, stores and other structures needed for recreation or public convenience, helped the already well-developed recreational use of the forests. This development had been under way for some years, many people having built summer homes on the year-to-year permit plans. Under the 1915 law the Secretary of Agriculture has fixed a charge of from \$10 to \$25 a year for summer homes and somewhat higher rentals for hotels and other commercial projects.

So long as the Forest Service dealt with matters connected only with preservation and revenue, the average citizen looked upon the Forest as a region apart from

his daily affairs and gave the subject but little thought. As soon, however, as the great West awakened to the fact that our National Forests are in reality personal assets, the most wonderful playgrounds in the world, open to any citizen for his use and enjoyment, the Forest Service began to grow in public esteem. The popularity of this movement is now evidenced by a widespread demand for home sites in several forests, and thousands of people, cognizant that the neighboring forest is open

for their use, are flocking there for vacations. The first comers are always boosters, and as a result an enthusiastic western public is to-day encouraging and supporting the Forest Service in broadening its activities in the direction of recreational use of our vast forest areas. The summer campers and woodland rovers have heralded far and wide their delightful experiences; magazines have published pages of captivating stories about the joys of a season in the big woods, and this year the National Forests were visited by thousands who came from distant parts of the Union. It is estimated that more than 1,500,000 people visited the western National Forests this summer, or nearly five times as many as entered the National Parks. Great as were their numbers, our National Forests, with an area of 132,550,000 acres, were not crowded.



TOURISTS AND CAMPERS ARE WELCOMED TO THE NATIONAL FORESTS

Splendid roads are being constructed to link the woods with the cities. Camp sites are located at advantageous points, with water piped from springs. The woodland trails are blazed on trees, marked plainly on maps, and the officers of the Service are constantly on the alert to render assistance to the visitor. Register and you will be looked after. There is only one "Don't" in the woods. "Don't be careless about fires."

On a summer tour, the forest visitor met and conversed with hundreds of other summer campers and tourists. In the log cabins, the rough lumber bungalows, in the tent houses and brush lean-tos, in moving vans and completely equipped camp autos, were to be found an enthusiastic and healthy army of city and country folk enjoying to the full the exuberant life of the clean out-of-doors in the most wonderful playground in the whole world.

In remote and unexpected places, back in the fastnesses of mountains and primeval woods they were found, whole families of them, having a wide fling with nature



THE ARROWHEAD FROM ROCKY POINT

The upper Klamath Lake in Oregon is a noted summer resort for Californians and Oregonians who have erected here many beautiful villas. On the shores of the lake, which is partly in the Crater National Forest, the Service has plotted numerous camp sites. The trout fishing here ranks with the best in the United States.



VIEW IN CHELAN COUNTY, WASHINGTON

The enthralling spectacle of snow-capped mountains, glaciers and multiple waterfalls in the Chelan country, Washington. At the head of Railway creek trail are a dozen hanging glaciers, beautiful lakes and many waterfalls, accessible for the horseback tourist. On Smoky Pass, the end of the trail, the panorama of snow-capped mountains is of indescribable beauty. The swift rushing streams are well stocked with gamy trout, and in the dense forests are many varieties of deer and bear.

in a wilderness untouched before. Toddlers, rosy-checked, sturdy lads and lassies in blue jumpers and bloomers, young mothers and grandmothers, tired farmers and city men, young and old, were there, forgetful of world worries and toil-wear in the rejuvenating atmosphere of primitive nature.

In the forests of New Mexico, Colorado, Wyoming and California were to be met citizens from many states. In a single hour the autos from eleven states passed one camp in a Colorado forest. In Wyoming a visitor rode into the Big Horn range with fifty tourists from a dozen eastern states.

The popular conception of our National Forests as inaccessible wildernesses is being rapidly dispelled. The good roads movement, so well developed in California, has spread to all the western states. The populous western centers are keenly alive to the benefits and advantages of first-class highways extending to the boundaries of



A NATIONAL FOREST CAMP SITE

At many popular camp sites the Forest Service provides a big concrete stove for the camper. Eagle Creek Camp on the Columbia Highway, Oregon, is a charming camp site and is frequented by hundreds of people from Portland. A recreational park including several thousand acres of woodland has been set apart as a recreational reserve and \$10,000 has been spent on new trails to open the woods for visitors. The park already has become a distinct feature in the magnificent Columbia Highway trip.

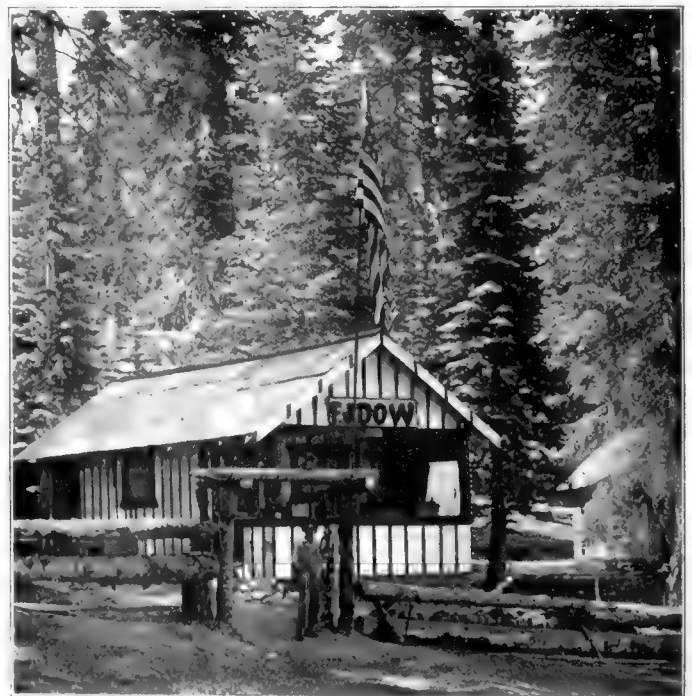
sible for conveyances of all kinds some of the most beautiful parts of our country.

In all these activities, so far reaching in their present



TYPICAL CAMP IN PECOS NATIONAL FOREST

On the banks of the Pecos River, a large number of campers from New Mexico and other states gather at this site. The Forest Service has provided a large tent and a concrete stove for the campers. The site is a popular spot for picnicking and camping.



HOME ON A NATIONAL FOREST

On the shores of Huntington Lake, in the heart of the Sierras, Californians are awake to the delights of a summer home in the woodlands. With the assistance of the Forest Service, many charming homes have been erected on leased land and every year an increasing number of families flock here from the hot cities of California's great interior valley.



LOS ANGELES MUNICIPAL PLAYGROUND IN ANGELES NATIONAL FOREST

In this sylvan retreat the progressive City of the Angels provides a two weeks' vacation for thousands of its school children. In groups of two hundred, accompanied by parents and teachers, the children are brought close to nature in her most beautiful forms. Hiking, bathing, nature studies, and other out-door pastimes are enjoyed. The entire cost per individual is only \$7.50, including transportation.



LAKE CHELAN, AMERICA'S LAKE LUCERNE

This is one of the most beautiful bodies of water in the world. It is completely surrounded by lofty timbered mountains. Its shore lines are picturesque and rugged and the country all about it offers numerous and varied attractions for the camper and tourist. Under the supervision of the Forest Service, tracts are being constructed, camp sites located and a new wonderland is being opened up.

and future value to the West, the Department of Agriculture has been prominently identified. Some of the best highways approaching the Forests have been built by these engineers with funds contributed by states and counties. A new era of economy and efficiency in highway making is opening all over the West.

In the Forests, by reason of more liberal appropriation, the work of road and trail making is proceeding apace with that outside the boundaries. The best camp and villa sites are being linked by fine roads. Leading out from these, innumerable trails for the pack outfits and the mountaineers have been built to make accessible the loftier and more impressive viewpoints. Throughout the forests the trails and roads are plainly marked, telephones are conveniently located, springs, camp sites, good viewpoints, gasoline stations, stores, hotels, and practically everything a traveller should know are clearly shown on the maps or marked on the trees along the highways.

The first thought that comes to you on entering a National Forest is that you are welcome. There is but one "don't" in all the legends you read on signs and maps,—“Don't be careless about fires.”

The ranger who greets you somewhere in the forest won't ask your pedigree or your politics. You'll look just as good to him whether you are on foot or in a limousine with the latest camp outfit, and you'll be just as welcome. The forest is a great leveller. An instance of this occurred last summer, when a careless camper with an expensive touring outfit and a sagebrusher with a span of burros and a dilapidated wagon were both brought back into the forest and there compelled to clean up their respective camps and also to put out their neglected fires.

In its effort to render the greatest amount of pleasure to the camper and summer home builder the Forest Service has given thoughtful consideration to many details. The comfort and convenience of the former is aided by furnishing camp stoves built of concrete which, by the way, also lessen the fire risk. The Forest Service has also piped water from distant springs, cleared away brush, surveyed and planted attractive sites, and at all

times has rendered helpful assistance in the building of the summer homes.

While the regular duties of the ranger are onerous and trying, and the advent of an army of summer visitors brings added cares and burdens and no extra pay, the attitude of the forest man is obliging, kindly and helpful.

In California the recreational use of the forest has assumed proportions calling for the utmost tact and diplomacy on the part of the administrators. In the Angeles Forest thousands of people make use of the camp sites. So popular has this form of vacation become that the city of Los Angeles has leased a large tract of land in this forest, erected thereon thirty or more cottages, a mess hall, and a concrete bathing pool. Throughout the summer months the city arranges to transport and care for parties of pupils and teachers to the number of two hundred at a time. A two-weeks' vacation is provided for in the forest and the entire cost is about \$7.50 per person, including transportation of more than 200 miles.

In the Sierra National Forest the Normal School of Fresno has leased a tract of land on the shores of Huntington Lake, and a summer school is held there. In the Pecos National Forest a number of Boy Scouts are given a summer vacation with lessons in forestry by a ranger as an added attraction. In the same forest a camping company has set up tent cities in various places of interest and a summer tour with frequent stops is provided. One of these, a trip to Lake Peaks, 12,000 feet elevation, is made in a single day on horseback.

The increasing demand for camp facilities in some of the forests, especially in sections where the highway systems from the cities have been completed, has brought about a new classification of certain areas. Heretofore these areas were regarded as chiefly valuable for the timber upon them, but with the clamor for camp sites the recreational use of these lands far exceeds their value for timber, and henceforth the axe will touch here no giant pine or fir so long as it can hold its head to Heaven.

In the Oregon National Forest one Sunday morning last summer there were 400 automobiles parked in and



THE FIRST AUTO ON THE NEW BLEWETT PASS HIGHWAY, WASHINGTON

This splendid roadway constructed by the Forest Service connects with new state and county roads between Wenatchee and North Yakima and opens to the summer tourist a region of unusual charm and beauty, between two of the noted fruit-growing districts of the State. Blewett Pass in former days had a reputation for bad roads and heavy grades.

about Eagle Creek bridge, on the Columbia Highway. This particular section, by reason of its great scenic beauty and natural advantages as a camp site, and in response to public demand, was mapped and a tract comprising 13,873 acres was set aside for recreational purposes. Ten thousand dollars is being spent on trail work and a veritable wonderland is soon to be opened.

In every forest visited the development of transportation facilities for the use of the public was going on as rapidly as the funds permitted. With the awakening of



ON HIS CHOSEN SITE

Building the summer home in the Sierra National Forest on land plotted and leased for home sites by the Service. Our National woodlands, under generous Federal policy are growing in popularity each year as summer retreats for thousands of families.

the West to the individual ownership its citizens have in the forests, with the increase in the number of permanent summer dwellings and with the growing popularity of the forest as the best health resort and playground in the world, may be confidently anticipated a more liberal policy of appropriation and a larger grant of power to the bureau which has so eminently proven its fitness for the task of administering this magnificent estate.

The economic value of the National Forests heretofore has been measured in dollars and cents. It seems not improbable that their value as playgrounds in the not distant future may be regarded even more highly.

RESOLUTIONS asking more liberal support for the Texas State Forestry Department at the hands of the next Legislature were adopted at a recent meeting of the Texas Forestry Association. Speakers estimated that \$20,000 is the minimum on which the efficiency of the department can be maintained.

NEW FEDERAL GAME PRESERVE

PRESIDENT WILSON has issued a proclamation by which the Pisgah National Forest, in western North Carolina, is made a Federal game preserve. This is the first Federal game preserve of its kind to be created east of the Mississippi River. The Pisgah National Forest consists largely of the George W. Vanderbilt estate, part of which has been purchased by the Government. The land is located near Asheville and Biltmore, North Carolina. Owing to the protection against hunting which has been afforded the tract for a number of years, the game has not been killed out, as is the case in most places in the southern mountains. Deer, wild turkey, and pheasants are said to be plentiful.

After it was known that the tract would be acquired by the Government, many of the local citizens urged that the protection to the game should be continued. The North Carolina Legislature passed an act whereby the State consented to the enactment by Congress of laws for the protection of game, birds and fish on any lands purchased by the Government under the Weeks Law in the western part of the State.

As a game preserve, no hunting will be allowed on the Forest and as the deer and other game increase on the area, it is expected that the overflow will drift out of the Forest and gradually restock adjacent lands. A movement is now on foot to place a herd of elk and one of buffalo in the preserve this winter.

Regulations governing the camping and fishing privileges have been drawn up in cooperation with local citizens and sporting clubs, and will be issued by the Secretary of Agriculture. It is understood that regulated fishing will be allowed, but the number of permits issued the first season will be purely experimental, since the capacity of the streams is not known.

CALIFORNIA'S PROBLEMS

THE twenty-eight million acres of forest in California bristles with problems for investigation, and the University of California has now completed the organization of a new department of forestry in order to try to help solve them. Nobody knows yet how fast California trees grow. The division of forestry wants to find out, so that the state, counties, towns and railroad, lumber and water and power companies can devise wise policies for growing permanent crops of timber on the vast acreage unsuited for other purposes.

The university also wants to train specialists in tropical forestry to solve the problems of the vast forests of Central and South America and the orient storehouses of untouched wealth.

ASTRIP of almost solid forest, approximately fifty-five miles long and from two to eight miles wide, has been covered by topographers of the Pennsylvania Forest Service in the most accurate survey of Pennsylvania's forests ever made. The purpose of the surveys is to secure data on which to base plans for the future development of the State Forests.

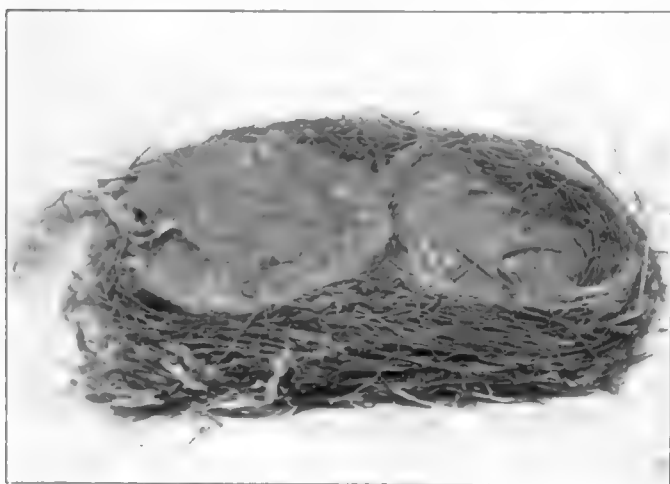
Some Problems With Everyday Birds

A Department for the Instruction and Information of Members of the American Forestry Association Regarding Birds and the Conservation of Bird Life

BY A. A. ALLEN, PH.D.

AS the years go by and the number of ornithologists and people interested in birds and bird life is continually increasing, investigations are carried further and further afield, until the most remote and inaccessible corners of the globe are being searched for new birds and new facts about those already known. But the world is not large enough for all to be travellers and explorers and there are many who must be content to stay at home and interest themselves in the problems of every-

at its structure, however, would convince anyone that the two compartments were built at the same time and that both had been occupied. The author was at a loss to account for it and therefore when this spring his attention was called to a similar pair of nests that were still occupied, interest was redoubled. The two nests had a common foundation over the post of a front porch and adjoined each other closely although the rims were distinct. The nests were not discovered until after both were completed and the eggs laid, so that nothing is known of how they were built. At this time, however, a bright-colored bird, presumed to be a male, was sitting on three eggs in one nest and a dull-colored bird, presumed to be a female, was incubating three in the other. As the author had to leave



A TWO-FAMILY ROBIN'S NEST

How the modern apartment house idea is adopted by birds—although the condition is so unusual as to arouse particular interest and many surmises as to the cause, one of which is that the father of the family is a polygamist.

day birds. Many questions have lain unanswered for generations, others are continually arising, so that the stay-at-home ornithologist should never be at a loss for something to do. Some of the problems bear directly on the birds' relations to man and are of great economic importance; others are valuable in our search for truth or interesting in the parallel which they make to our own lives. All of them give new zest to the study of birds and disclose how much goes unseen and how little of what we do see, we understand. They teach us to observe more carefully and to reason logically.

Perhaps no field of ornithology offers greater opportunity for discovery than that of the home life of birds, and certainly no field is more delightfully full of surprises. One has a reason to feel, for example, that everything that can be learned about robins has already been discovered and published. Here, however, is an incident which will bear further study.

A few years ago there was brought to the author a double robin's nest shown in the accompanying photograph. It was not discovered until after the birds had left, so that nothing was known of its history. A glance



THE SECOND BIRD APARTMENT HOUSE

The history of this double nest shows that three robins had shares in it, although the ornithologists are not able to satisfactorily explain the reason for this departure from their usual habit.

by an early train, further observations were made by the discoverer of the nest, Miss Mabel Carey.

The day following, another egg appeared in the "female's" nest and two days later, the eggs in the "male's" nest hatched, showing that there must have been an interval of nearly two weeks between the laying of the two sets of eggs and probably, therefore, between the building of the two nests. With the hatching of the "male's" eggs, the "female" showed considerable interest in the young birds and helped to feed them several times during the day, although she spent most of the time on her own nest. Now, however, a third robin appeared, bright in color like the first "male" and helped feed the young but did not stop to brood. Neither of the two "males" showed much interest in the "female's" nest until four days later, when "male" number one was seen to incubate

the eggs for a short time when the "female" was in search of food. The second "male" continued to help feed the young and often came when both of the other birds were present, the first "male" usually leaving upon his arrival but sometimes merely backing up and permitting him to feed.

Thirteen days later all four eggs in the second nest hatched and the other young were almost ready to leave, crowding over on to the second nest until the "female" had difficulty in getting upon it to brood the newly hatched young. The next day the "male's" young flew to the ground, while the "female" continued to brood until the middle of the afternoon. She did not, however, feed them and before evening deserted them to help feed the fledglings with the result that the next day all were dead.

Now what is the explanation of the double nest? What were the relations of the three birds and why did the "female" desert her young? The greatest difficulty arises because the sexes of the different birds could not be determined accurately. The two brightly colored birds have been called "males," but it is known that mature

birds being a female and the case as one of polygamy. It is known that polygamy does occur among birds, but nevertheless, it is difficult to explain why two females should nest so close together. It is unfortunate that the birds were not observed when selecting the site, so that it might be known whether both worked together, or whether the duller, more immature bird came later and merely annexed herself. This sort of polygamy occurs with the red-winged blackbirds when the later-migrating, immature females, which have difficulty finding mates, submit to the driving of a male already mated and are content to settle somewhere within the area defended by him, usually within five or ten feet of the nest of his first mate. It might be well to explain here that mating with most birds consists of the acceptance by the female of



A "DUMMY" NEST

This was built and is owned by the long-billed marsh wren. These wrens are architectural plutocrats because they build several nests in which they never live. Why they do it has never been satisfactorily explained.

females may be as bright as males and one or the other might have been a female. We have, therefore, two alternatives.

Assuming that both of the bright birds were males, we would have a case of polyandry, but it is difficult to understand how two males could live amicably together, or why the second male should help the first in the care of the young. It is too far removed from bird or animal nature as we know it. When polyandry does occur, there is usually no spirit of coöperation between the different males. It is much easier to think of one of the bright



A BELIEVER IN MORMONISM

Here is a house wren that had two mates at the same time and fathered four broods of young and seemed to be proud of it.

the nesting area selected by the male and the power of the male to keep other males out of this area. It is furthermore known that most birds return each spring to their former nesting sites and that the females reaccept their former mates provided they are still able to drive off all other males. Now it is possible that both of these female robins may previously have nested for one brood or another on this porch and, coming back together this spring, may both have accepted the one male capable of driving away all others.

A reason for the desertion of her newly hatched young by the second female lies in the fact that a bird's instinct to feed and protect fledglings is much more powerful than its instinct to care for newly hatched young, a fact that bird photographers must always bear in mind, especially when working with wary, sensitive birds in which the

instinct of fear is strong. Birds that are impossible subjects while incubating or brooding newly hatched young are nearly fearless as the young leave the nest. The yellow-breasted chat is a good example. It has proven a stumbling block to photographers for twenty years, because all of its instincts are subservient to that of fear or caution. It will desert its nests and even its young upon the slightest provocation, so that it is practically



A SOCIAL VISIT

This family of rough-winged swallows is entertaining a visitor with whom they appear to be on most cordial terms. The writer wonders if this is the beginning of a social instinct among birds.

impossible to secure a photograph of it. When the young are leaving the nest, however, the instinct to feed and protect them reaches its highest point, nearly balancing the bird's fear, so that during the past summer it was possible, with the exercise of sufficient caution, to secure some photographs of the male bird feeding the young. In the case of the robin, then, the flight of the young from the first nest aroused in the second female the more powerful instinct and she deserted the newly hatched young to care for the fledglings, even though they were not her own.

Observation of unusual cases such as this one of the robin is often suggestive of the origin of inexplicable habits among some species of birds. For example, many members of the wren family, including both species of marsh wrens, the house wren, the winter wren and at least three species of South American wrens and probably others, build duplicate nests. These have been variously called "cock nests," "dummy nests," etc., but they have never been satisfactorily explained. The house wren, for example, fills every hole and every nesting box in the vicinity with sticks before commencing the actual nest that is to be used. The marsh wrens build six or seven nests within a short radius, only one of which is used. The winter wren does the same, although, because of the nature of its nesting site, the various nests are farther apart. In each case the nest building does not cease with the completion of the real nest but continues throughout the season and it is not uncommon to find marsh wrens still building, after the middle of August, nests which will never be used. The explanation for this

curious over-development of the nest-building instinct is difficult to see but careful observation of a large number of cases may shed some light upon it. The case of a pair of house wrens which built upon my porch is particularly elucidating.

The male bird, as usual, appeared first in the spring and immediately began filling all of the nesting boxes in the vicinity with sticks. Other males that appeared were promptly driven off. After a few days a female appeared and remodelled and completed the nest which the male had started in the box on the porch, the male helping her at intervals but also continuing to carry sticks into other boxes. By the time the complement of seven eggs was completed, we discovered another pair of wrens nesting over a neighbor's door, but soon afterwards observed that the two males were never singing at the



CAN YOU SEE HIM?

A song sparrow on its nest, well hidden from prying eyes and from enemies because it is streaked like the grasses which it inhabits and seems a part of them.

same time and began to suspect that something was wrong. At this time our male got caught in a sparrow trap and we placed an aluminum band on his leg to mark him. Identification was now comparatively simple and we easily followed the bird from one nest to the other. It was obviously a case of polygamy. An even stranger part of the story follows:

Thirteen days after the laying of the last egg, we looked into the box in the morning and found the young hatching. Two days later, when we came home at noon, we found the male bird throwing hair and feathers out of the nest and every young had disappeared. It was evident that the young had preceded the feathers and that the father of the family was on the rampage. We hastened to the neighbor's nest expecting to find another

scene of devastation, but were happily disappointed. Here, too, the eggs had hatched, but the young were still unharmed. In fact, while we were still there, the male came from our nest and began singing in the nearby tree with all his previous exuberance. Nor did he disturb this nest at all, but helped to feed the young until in due time they left the nest.

But what became of our female? Four days passed before she reappeared and when she did do so, it was with a feather in her bill, and she set to work to rebuild the nest that the male had ruined. The male had continued to sing in the vicinity as though nothing had happened and when she reappeared he mated with her as before. Six more eggs were laid and these did not hatch until the young had left the other nest. This was apparently more satisfactory to the male for, although up to this time he had been assisting the other female to feed her young, he now became very attentive to our young and assisted them through to maturity. In the meantime, the other female got her young started in life, came back,



ALSO OF THE SPARROW FAMILY

The chipping sparrow has departed somewhat from the type color pattern, having lost the streaks that once marked its underparts.

renovated her nest and with the help of the male started another brood. Thus the male fathered four broods, one of which he did away with, apparently because he could not care for two broods at the same time.

How general polygamy is among wrens has not yet been recorded, for it takes unusual conditions to determine it accurately. But the fact that they are so at all suggests a good explanation for the duplicate nests. These duplicate nests are built entirely or nearly so by the male birds and very probably to attract the females as a sort of a mating performance. The fact that the males continue to build after having secured one mate, and the fact that the habit is so prevalent throughout the family suggest that polygamy was one of the fixed habits of the wren progenitors and that duplicate nest

building and occasional polygamy are the vestiges of this ancient habit.

Another interesting problem that concerns the home life of birds is that of the gregarious nesters like the night herons and the bank swallows. Why this habit should have developed with certain species and not with others will always invite thought and theory. That the presence of others of the same species nesting in the near vicinity is irritating to most birds is a familiar fact. Usually one pair, when nesting, will not permit the close approach of any other bird, especially one of the same species. Social nesters, like the bank swallows, are the exception.

The rough-winged swallows are particularly solitary



THE EVENING GROSBEAK

This bird is an unusual member of the sparrow family. He is marked differently from the typical sparrows, being bright yellow, black and white.

in their nesting habits as compared with the bank swallows. They nest in old kingfisher burrows, drain pipes or crevices in the cliffs and though two or three pairs may build in the same vicinity, they are never truly gregarious or social and resent the approach of other individuals near their nests. While working with a pair that were nesting in an old kingfisher burrow, I noticed two other swallows which were nesting at a considerable distance occasionally flying past or even hovering for a minute before the entrance to my birds' burrow. Usually they were promptly set upon and driven away. Gradually I became aware, however, that both birds of the other pair were not being treated alike. One was always, without exception, attacked by both my birds and driven away, while the other passed to and fro without molestation. When I removed the young from the nest and perched them on a wire fence to photograph them, the second pair of swallows appeared and, as usual, one of them was promptly driven away but the other was allowed to remain. In fact, this swallow caught a passing damselfly and actually fed it to one of the young as though it

were its parent. The accompanying photograph shows all three birds perched on the fence with the young just after the fourth bird had been driven away.

Now how shall we interpret this strange preference which the swallows were showing for one of their kind? Are we to think that the pair of swallows had formed some sort of an attachment for the third bird like a human friendship? Was it a symptom of polygamy, or can we read in it the origin of the social instinct in other swallows by the overcoming of the natural antipathy to another bird of the same species? It is not sufficient in explaining the origin of a social instinct in birds to state that they have come together for protection or on account of restricted nesting sites because a far larger number of species suffer from these restrictions or need of protection than actually avail themselves of the opportunity of nesting together. They have first to overcome that natural antipathy toward one another, especially during the nesting season, which has been so necessary for the dispersal

of the species and for maintaining a sufficient food supply. The bank swallows have overcome it entirely, whether through polygamy or what not, we do not yet know. Possibly the rough-winged swallows are coming to it. Certainly it offers a fascinating field for study and experiment to one located near a colony of social birds.

These are but a few of the numerous observations which anyone might make and which help to make the study of ornithology most fascinating. The hundreds of little points in a bird's home life, in its migrations, in its feeding habits or in its coloration that are at present without explanation will eventually yield their secret to careful observers. Which discoveries may prove of great value to mankind and which will only add to the treasury of knowledge, the discoverer may never know and the world may never recognize, but just as surely as anyone interests himself sufficiently and trains himself to observe conscientiously, just so will he learn new secrets and reveal new truths about our every-day birds.

The Sparrows

(Family *Fringillidæ*)

THE sparrows, finches and buntings constitute the largest family of birds, including over 1200 species and subspecies. They are found all over the world except in Australia, but are most abundant in the Northern Hemisphere. In North America, north of Mexico, 91 species have been recorded and in Eastern United States 45 species are to be found.

By most ornithologists the sparrows are considered the highest development of bird life. They are generalized in their structures rather than specialized, and in this age they are the dominant birds of the world. Geologically speaking, this might well be called the "Age of Sparrows," just as in the past we have had an Age of Divers, an Age of Waders, an Age of Woodpeckers, etc. The strong conical bills of the sparrows, although thus modified for crushing seeds, are at the same time sharply pointed to enable them to pick up the smallest insects. They are correspondingly versatile in their feeding habits, so that while in fall and winter they feed almost entirely upon seeds, during the summer they consume great quantities of insects. They are, therefore, among our most valuable birds both for their consumption of weed seed and for their destruction of insect pests.

The typical sparrows are rather dull-colored brown and gray birds, usually heavily streaked, so that they resemble the pattern of the grasses among which they live,

for the majority of them are terrestrial birds, feeding and nesting on or near the ground. The family includes, however, the grosbeaks and buntings, many of which are brilliantly colored, and the line separating the sparrow family from that most brilliant family of all, the tanagers, is nowhere very sharp.

Many species of this family, especially exotic ones, have beautiful songs, and are best known as cage birds, the canary and bullfinch being familiar examples. Our native sparrows and grosbeaks are second only to the thrushes in their musical ability.

Sparrows build well-formed nests of straws and grasses, lined with finer grasses and horsehair, a few species using cotton or feathers. Most of them lay bluish eggs, more or less spotted with brown. Young sparrows of all species are more streaked than the adults, and where there is a difference in color between male and female, they resemble the female. For example, young chipping sparrows have heavily streaked breasts, although

this is true of neither parent, and the young of the rose-breasted grosbeak are brownish and streaked like the female bird. This shows that the original pattern of the sparrow family was one of streaks, like that of many species today, and that all the uniformly or brilliantly marked species have developed away from the main stem.



YOUNG CHIPPING SPARROWS

These youngsters show the streaks which their father and mother and all their adult relations have lost. The bird in the middle is a young cowbird.

Sparrows are plastic birds and respond readily to the factors of their environment, excess of light and aridity tending to make them pale in color, and excess of humidity and shade making them darker. Thus among such widely distributed species as the song and fox sparrows that are found throughout North America, we find a remarkably pale race in the hot, arid regions of the west, while those of the Pacific Coast are very dark. The birds of Eastern North America, on the other hand, where conditions are not extreme, are intermediate.

Typical sparrows are hardy birds. Many species never migrate and others retire southward only short distances, remaining in cold latitudes throughout the winter. A few are highly migratory, the indigo bird and blue grosbeak wintering in Central America, and the rose-breasted grosbeak continuing as far as Colombia or Ecuador. Among the familiar winter birds of Northern United States might be mentioned the tree sparrow,



LIKE FATHER? OR MOTHER?

When the male bird is brighter in color than the female the young resembles the female. Here is a male rose-breasted grosbeak feeding its young.

snow bunting, longspurs, redpolls, pine and evening grosbeaks, pine siskin, and crossbills. These birds nest in the far north and come southward only far enough to find food. Some that remain throughout the year, or migrate only short distances, include the goldfinch, purple finch, song sparrow, junco and the ubiquitous house sparrow. Others that are more migratory, and spend the winter in southern United States, include white-throated, white-crowned, vesper, chipping, field and fox sparrows, and towhee.

All of these birds are easily attracted to feeding stations during the migration or during the winter, if a plentiful supply of seeds is afforded. The cracked grain sold for small chicks, with an admixture of sunflower seeds, is most satisfactory.

Feeding the birds in winter is a delightful and instructive pastime and a real help to trees and gardens. Directions for maintaining a feeding station at or near one's window will be found in *AMERICAN FORESTRY* for December, 1915.

PULPWOOD STATISTICS INCLUDED

FIGURES showing the amount of wood used in the United States for making pulp will, it is announced, be obtained by the Forest Service in connection with its 1916 census of the lumber industry. Because of the increasing scarcity of the pulpwood in some parts of the country, the need for accurate figures showing the consumption of this class of material is realized by manufacturers and foresters alike and it is expected that such figures will be made a part of the yearly statistical work of the Forest Service. The pulp manufacturers will cooperate in the work, through their trade organization, the Newsprint Manufacturers' Association.

Detailed information in regard to the amount and cost of different kinds of pulpwood consumed in the different states is to be collected. Comparative figures showing the total pulpwood consumption of the country for 1899, 1909, 1914, and 1916 are to be compiled.

The data to be obtained will, it is stated, be of considerable value to pulp manufacturers, as well as to the Forest Service. Owing to the comparatively small number of pulp mills in the United States, it is thought it will be possible to issue a report on the work at an early date.

NEW YORK TO BUY FORESTS

AT the recent election the people of New York State voted to tax themselves \$10,000,000 for the purchase of forest preserves. The fact that this was not done by act of legislature, but by a referendum, shows how popular the idea of state forests has become with the people at large. The forest preserves of New York are not only of great economic importance for the preservation of the water supply and of local industries, but serve as an immense park which is visited annually by millions of people. Of the total amount voted, \$7,500,000 will be available for further purchases in the Adirondacks and Catskills, where the State owns already 1,814,550 acres of forests and lakes, and \$2,500,000 for the Highlands of the Hudson Preserve. A private subscription of a like sum had already been secured contingent on the passage of this proposition of the referendum. There will, therefore, be available altogether \$5,000,000 for the completion of a great interstate park in the Highlands of the Hudson.

This splendid example set by a wealthy state will undoubtedly have a valuable influence on other eastern states. The fourteen thousand acres which the Vermont Forestry Department has acquired is a good start in the right direction, but it is only a drop in the bucket compared to the 3,000,000 acres of woodland in the State.

Rocky Mountain National Park

By MARK DANIELS

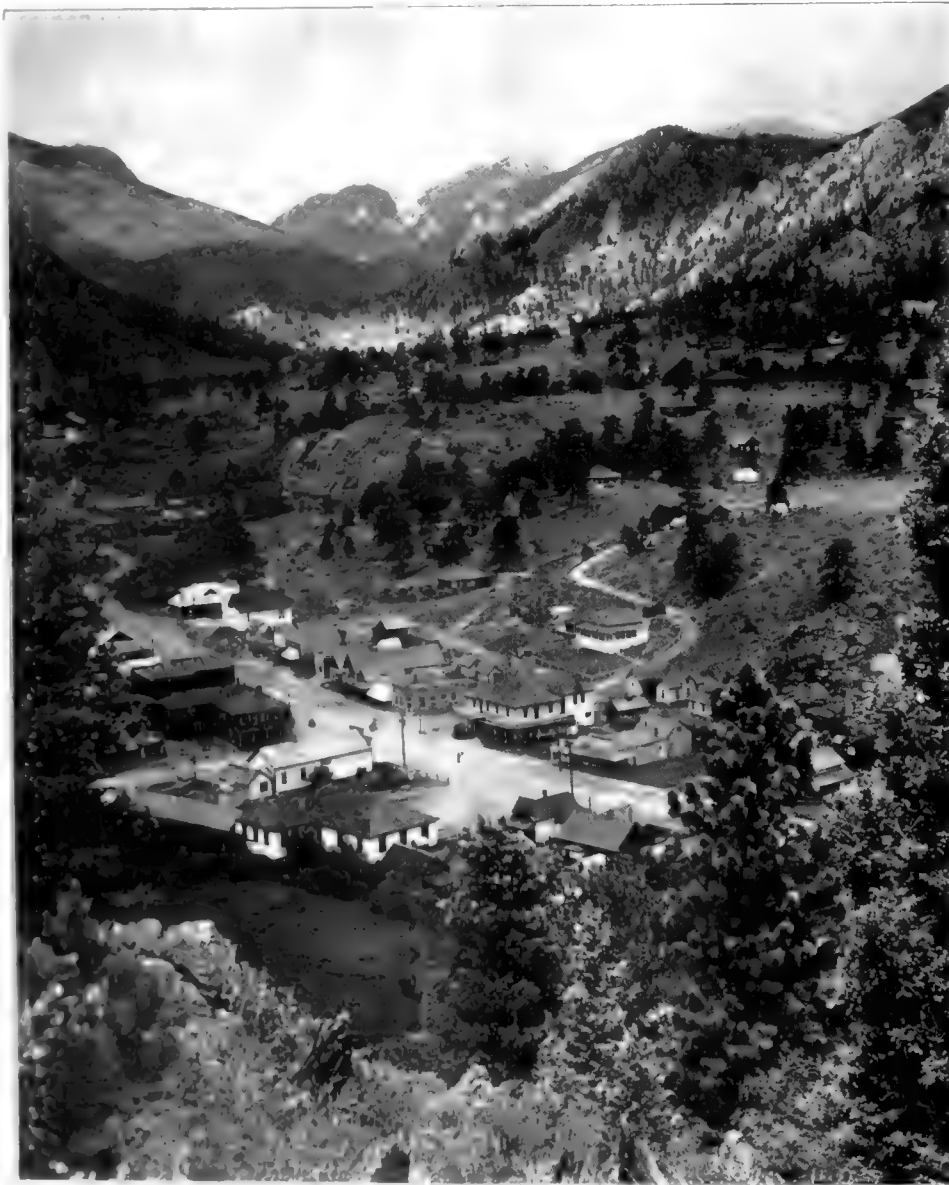
Former Superintendent of National Parks

THERE are many who consider the name "Rocky Mountain National Park" as nothing short of an inspiration, and I know that any criticism of this title of one of our national playgrounds will make the hair on the æsthetic necks of those who had much to do with the naming of this Park bristle with antagonism. Not that the name has much to do with the Park, for, after all, what's in a name? And if those who named a lake "Round Lake" because it was round, "Red Peak," because it was red, and "Gray Peak," because it was almost gray, have continued to draw their inspiration from the same inexhaustible source, who should criticise them for naming the Rocky Mountain National Park as they did, because it is in the Rocky Mountains? Such consistency deserves compliment rather than criticism. Nevertheless it would seem that something more specific than the particular cognomen selected might have been introduced which would indicate either that this National Park did not extend from the Gulf of Mexico to the Canadian border or that it was located where it was for some specific purpose.

Mount Rainier National Park is definitely indicated by its name; Glacier National Park is more or less described by its name, and so with Mesa Verde, Sequoia and most of the others. They might have called it "The Rocky Mountain-Colorado-Sixty-Miles-from-Denver-National Park" without, in the minds of many, having detracted materially from the euphony of the name selected.

I have heard the arguments in favor of this name and they are many. For example, it is contended that the

mind of the sweating husbandmen of the sultry east, whose thoughts at eve turn from heating labors to the long coveted trip to the cool and snowy heights, lights automatically and without mental effort upon the magic phrase "Rocky Mountains." What more logical, therefore, than a Rocky Mountain National Park? But can it not also be said that while we are thus saving the tired business man the labor of taking down his geography to determine where the particular national park he may read of is located, we are, by this very saving of effort, failing to broaden his knowledge of



ESTES PARK VILLAGE, ESTES PARK, COLORADO

This village nestles at the base of the Continental Divide in one of the most beautiful valleys in the Rocky Mountains. The picture does not seem to bear out the statement in the Government bulletin to the effect that it is beautiful, despite the fact that the Stanley Hotel has done a great deal to lift the village out of the class of townships.

the country he lives in. I have also heard that while this name has not the musical value of Sequoia, Yosemite and Rainier, there is no doubt that there is in the phrase "Rocky Mountain National Park" a certain hardness and roughness which, when the phrase is once fixed in the memory, prevents it from slipping out too easily. To all these arguments I can only say that it is sincere love for this beautiful area that suggests the advisability of selecting for it the best name possible, and if this has been done, there is nothing more to be said. Whether the name that it shall forever be known by is beautiful or not, there is no doubt that "Rocky Mountain National Park" contains some of the most wonderful scenery we have in this country.

There is no scenic reservation in our system of National Parks which is so well located to serve the people as the Rocky Mountain National Park. It is but fifteen miles or so from Fort Collins, which is the terminal of a branch line of the Union Pacific system, and may be reached in cars of the Union Pacific Railroad Company's standard service.

It is about sixty miles from Denver, whence it can be approached by motor over some of the finest roads in the State of Colorado. It is in the eastern portion of the Rocky Mountains and is, therefore, about the first location of high elevations that can be reached by the westward exodus from the hot valleys of the Mississippi and the Missouri. A thirty-six hour ride from Chicago will land one practically at the toes of the Park. This means that a very large percentage of the population of the United States has at last a national park, embracing glaciers, sparkling lakes and lofty peaks, within thirty-six hours' train ride from their own homes. In addition to this, when the tourist is landed at Fort Collins on the Union Pacific, he is not dropped like a lost soul in the wilderness, but steps from the train on to the platform of a modern and well-kept-up depot, back of which lies a town that is bidding strongly for the reputation of being spotless.

Fort Collins is a picturesque, attractive and interesting town and one that is well calculated to place the tourist in that frame of mind which precludes quibbling over such minor inconveniences as dusty roads, springless wagons and federal politics, the last of which seems to be, like the poor of Christ's parable, ever with us in Colorado.



Photograph by Wiswall Brothers, Denver.

ROCK CLIFFS, BIG THOMPSON ROAD TO ESTES PARK

One approach to the Rocky Mountain National Park is up the canyon of the Big Thompson. The road, for many miles, skirts the very edge of the roaring, rushing waters of the river, clinging meanwhile at the base of the great cliffs. It is one of the most beautiful drives to be found in this country.

Why federal politics should pick on a state whose residents must make scenery at least the dessert of their daily nourishment is rather difficult to conceive, unless it is that this State on the top of our continent presents temptations as a site for junketing parties. Or perhaps it is that an architect of talent and ability once conceived, at the instigation of Mr. William Randolph Hearst, a summer home for the President, situated on the precipitous peaks surrounding Denver, and through the broad medium of the instigator's publications instilled into the minds of federal politicians a scheme by which they could justify trips to the Rocky Mountains. In any case, the fact remains that if you visit the Rocky Mountain National Park, you must mind your P's and Q's and be careful

to carry with you certificates of political faith testifying that you belong to any and all parties. Not only must this be done, but the possibility of springing one certificate on the wrong party must be carefully avoided.

As an example of the influence of the Colorado vote, the first attempt to appoint a superintendent of the Park is an excellent example. Acting on the instructions of the Secretary of the Interior, a department official was interviewing likely candidates in a room, the door to which would not close. Having found, perhaps, the best man for the position that could be secured in that part of the country, he shook hands with his selection and stepped with him to the door. As he opened the door, a press reporter removed his ear from the opening just in time to save his head from coming into violent contact with a material that gave strong evidence of having supplied many similar heads. The next morning there were head-

lines announcing the appointments of the Secretary of the Interior to the offices in the new park, and the wires from Washington began to sing. As a result, a gentleman of culture and education who had agreed to accept a posi-

handsome profit on the deal. Perhaps all this discussion of political conditions may seem extraneous to the subject of scenery and national parks. It is, nevertheless, in the particular instance of the Rocky Mountain National



VIEW FROM THE ROCKIES

Oldman Mountain dominates the surrounding territory and rises like a protecting power over the park which nestles at its base.

tion that carried a salary materially less than his private income, was not appointed. The man who was big enough to have the job seek him was set aside, and the time-worn custom of going over the list of men seeking the job was again begun. However, the telegraph company made a

Park, of considerable value to the tourist who wishes to enjoy the scenery with the least possible annoyance.

The best approach to the Park is up the canyon of the Thompson River to Estes Park, a small village nestling at the base of Oldman Mountain, and surrounded on three

sides by the towering peaks of the Rockies. There are very few towns or villages in the United States that are so beautifully situated as is Estes Park, but here I must take issue with the author of that Department publication who calls the town "beautiful." The site is wonderful, and if one is inclined to place credit where it is due, he must say that God made a masterpiece of this beautiful valley; but in so far as I was personally able to ascertain through a stay of some length at Estes Park, there was nothing in the village that had been done by man that did not scream its impropriety. However, the assault upon the eyes made by the inartistic cottages and houses of Estes Park is short-lived, for no one who has ever breathed deeply of the air of mountain peaks can long withstand the call of the ridges that surround the village, and the excellent Stanley Hotel is really worth while.

There is a bit of road running from the village up the Fall River to one of the western entrances. In 1914 a small bit of this road had been graded into the Park and now there are within the Park perhaps as much as eight or nine miles of wagon road, two or three of which, horrors of extravagance, have been built by the Federal Government. If, therefore, the tourist expects to see anything of the Rocky Mountain National Park from an automobile, he is doomed to the bitterest of disappointments, but if he will ride or walk, the most beautiful part of the Park can be visited without staying away from the hotel over night.

There is a trail running from Iceberg Lake, in the northern portion of the Park, along a plateau that maintains, for six or seven miles, an almost constant elevation of twelve thousand feet. From this ridge the crest of the Continental Divide is silhouetted against the western sky across a great canyon half a mile in depth. This wonderful plateau enjoys the distinctive and descriptive name of Trail Ridge, it probably having been assumed by the namers that no other ridge ever carried a trail upon its undulating bosom. Speaking of names, the Rocky Mountain National Park offers much food for thought. There are Blue Lake, Black Lake, The Loch, Green Lake and possibly, if one had time to carefully study the map,

Red, Purple and Yellow Lakes might be found. These names stand out rather distinctively against such names as Ouzel Lake, Fern Lake and Shelf Lake, whose names seem to indicate something of the character they possess. Of course, the list of names in the Park, as usual, embraces a list of office holders in the Federal Government and local celebrities, who feared they might die with no other evidence of their having existed than their names upon a government contour map.



Photograph by Wiswall Brothers, Denver.

PORTION OF ROAD BUILT BY CONVICT LABOR

The Government has built but a small bit of road in the National Park, in fact it has built practically none of the road exclusively with Federal funds, but has used what meager appropriations could be secured from the State of Colorado, and, with the aid of convict labor, has built a few miles of very excellent road. The picture here shown is a portion of the Fall River road which was built by Colorado convict labor according to the excellent survey of the State Highway Commission.

The most interesting and picturesque part of the entire Park is the area embracing about fifty square miles centered around Long's Peak. Here the Continental Divide, which rises more gradually from the western boundary of the Park, drops off precipitously, leaving great glaciated cirques, vertical cliffs and tremendously deep canyons which, from a distance, seem to defy exploration. Odesa Lake, on Fern Creek, is an exquisite gem of green and blue, which seems to be almost surrounded by the jagged crests of the Continental Divide and its spurs. Further south, clinging fairly closely to the base of the eastern slope of the Divide, are Bear Lake, The Loch, Mills and many other beautiful sheets of water cupped in the hollow of granite walls.

There is a stretch of territory to the east of the Divide, and snuggling up close beneath its towering crest, which seems to be the place in this portion of the Rocky Mountains where nature concentrated in an effort to run the entire gamut of her repertoire of scenic wonders. This area begins at a point almost due west of the village of Estes Park, and runs south about seven miles. In it there are almost every form of scenic wonders with the exception of such phenomena as are to be encountered in Yellowstone National Park. The area is dotted with lakes and meadows traversed by innumerable streams, covered with beautiful forests and boasts of an occasional glacier thrown in here and there for good measure. In a small area, consisting of not more than one township, there are somewhere in the neighborhood of forty lakes, if one is willing to apply the name "lake" to some small sheets of water not more than one hundred yards in diameter. In this same area are the Andrews Glacier and

the Taylor Glacier. On the eastern extremity of this riot of scenery is Long's Peak, the highest peak in the Rockies, at the base of which is Long's Peak Inn, after which some people will tell you the peak was named. The proprietor of both is Mr. Enos Mills, a naturalist and writer who is accredited, according to the Interior Department's circular, with being "the father of the Rocky Mountain National Park." Such a statement from the Interior Department itself raises in the minds of some a doubt as to the verity of Government publications, and suggests the possibility of another dispute over parenthood. Such arguments, however, are not unique, for on every hand may be found naturalists who disagree with the Great Creator.

Mr. Mills has lived and operated his hotel in the shadow of Long's Peak for many years, and despite the fact that he is accredited with being the father of his inn, as well as other things, the hostelry itself looks much older than its owner. As a writer, it is known that he had nothing to do with the naming of the points of interest in his bailiwick, for anyone reading his delightful works would know that he would not have to resort to a list of paint colors as a source of names.

Long's Peak Inn is about ten or twelve miles from the village of Estes Park and is excellently situated as a secondary base from which to operate in the neighborhood of this area of intensified scenery. Most tourists who are fond of mountain climbing essay the ascent of Long's Peak after having been thoroughly fortified by a rest and other things to be had at the Inn. The vertical face of Long's Peak may be seen as a terminating feature at the western end of the canyon which flattens out to accommodate Long's Peak Inn, and it beckons the mountain lover, casting about him the irresistible spell of its mightiness.

Long's Peak is the highest of a group of several peaks, the tops of which are hardly a half mile apart. On the east there is a vertical precipice of some fifteen hundred feet in height, at the base of which is Chasm Lake, a

placid sheet of water in the bottom of one of the most distinctive glacial cirques in the district. Little or no foliage is visible in the neighborhood, and the entire scene is pregnant with an atmosphere of lofty silence. The ascent to the top of the Peak from the lower benches is not so simple as it seems, but can be safely negotiated if the spirit of foolhardiness does not overcome the climber. The trail to the top approaches the Peak from the north and east, threading en route the little canyon of Alpine

Brook, crossing over a plateau called Boulder Field, and striking a northward reaching spur of the main ridge about half a mile to the north of the Peak.

There is quite a distinction between not only the formation, but also the color of the peaks in the Rocky Mountains and in the higher Sierra of California. The Rocky Mountains are more colorful, and to him whose eye is not so sensitive to the delicate shades of lavender and warm grays, the deeper colors of the Rockies present more attractions. Nor is there the same degree of terrifying wildness about the peaks of the Great Divide that is to be found in the high Sierra. Nevertheless, it is safe to say that to one who is reaching a height in excess of fourteen thousand feet for the first time, there

will be sufficient in the panorama from the top of Long's Peak to recall his past wrongdoings with a suddenness that begets a determination to follow the paths of righteousness in the future. In the vicinity of Long's Peak there is a comparatively small area of that same precipitous storm-torn clutter of jagged peaks that may be found in the high Sierra stretching from Mount Langley nearly to Lake Tahoe, but the scope of nature's activities in sculpturing mighty peaks and chasms seems to have been, in the Rockies, limited to certain areas.

In considering the beauties of the Rocky Mountain National Park, the flora of the district should not be overlooked. As is known to many, the columbine is the floral emblem of the State of Colorado, and it thrives in the Rocky Mountain National Park in a profusion that is



Photograph by Wiswall Brothers, Denver.

THIS INSPIRES A SUGGESTION

The National Park Service might do very well to adopt the plan of building small drinking fountains in the most frequented locations, as the Denver Mountain Parks Commission has done. Whether the National Park would be as successful in securing such attractive modern Sarahs at their wells, as the Denver park system, is open to some question.

astounding; in fact there are meadows here and there that are fairly carpeted with Indian Paint Brush, columbine and an almost inexhaustible variety of mountain wild-flowers. The general effect of a short trip through the richest portion of this scenic area leaves the impression of having passed through a kaleidoscopic range of colors that is never to be forgotten.

Almost half of the Park lies to the west of the Continental Divide, and while it is sufficiently broken in contour to disturb the complacent bosom of the effete easterner, despite the fact that his sojourn on the Atlantic Coast enables him to negotiate the approach to Brooklyn Bridge without any marked acceleration of the heart action, it is still not nearly so rugged and difficult to travel through as is the eastern portion. Nevertheless, to many, the western half has its charm of forest cover, larger lakes and flowing streams which present a more peaceful and inviting picture. After all, to leave the sights of towering sky-scrapers, deafening riveting machines and roaring traffic, where all of the forces of nature seem to be fighting one another as agents for man in his pursuit of the elusive cartwheel of commerce, and to arrive at a scene where the forces of nature, undirected by the hands of man, have been shattering granite peaks into natural sky-scrapers, is not altogether a complete change, and viewed in this light, the western half of the Park may present the more attractive picture, excluding, of course, the valleys that seem to focus in the vicinity of the village of Estes Park.

There is a road, skirting about two-thirds of the western border of the Park, which runs almost due north and south along the Kawuneeche Valley. This road leads south to the village of Granby on the Denver and Salt Lake Railroad. Its northern extremity is nowhere in particular. About two-thirds of the way down the western border of the Park, however, there is the town of Grand Lake, on the northern shores of a lake of the same name.

Despite the fact that in our Government bulletins we find Grand Lake described as "a thriving centre of hotel and cottage life," there are many who will argue that its greatest asset is the fact that the surface of the Lake is 8,369 feet above the sea and over 1,000 miles from New York. The Lake itself, while not within the legal boundaries of the Park, is still embraced on three sides by these boundaries, and is, therefore, substantially within the Park. Its surface covers approximately one square mile and constitutes perhaps one of the most charming sheets of water in this part of the State of Colorado. Its outlet is into the Grand River. It is supplied from the innumerable lakes and snow-banks of the Divide through Tonahutu Creek and, most ingenious of names, the North Outlet and East Outlet. The last two named of these creeks or streams heads in a series of really beautiful lakes in the valleys of which here and there are to be encountered the numerous groves of aspens with their birch-like bark standing out like silver shafts against the background of vivid green. Along these streams, as along

most any other in the Park, there are to be found beaver dams that raise the level of the water here and there to make small hand-mirrors for the gods.

In the northern portion of the Park, which is closer to the village of Estes Park, there is the Hallet Glacier and Crystal and Lawn Lakes offering themselves upon the altar of scenic fascinations in their portion of the Park. The Black Canyon Creek and Roaring River branches of the Fall River head in Lawn Lake and present for those who love the view of moving water perhaps as interesting a side trip as can be found. There is also the Cache La Poudre River which heads in the Poudre Lakes at the crest of the Divide, but only six or seven miles of its headwaters are within the boundaries of the Park.

It is to be deeply regretted that when the Park was established, sufficient area was not enclosed within the boundary lines to include another district of scenic beauty which lies about ten miles south of the present southern Park boundary. The Continental Divide runs almost due north and south after it emerges from the southern end of the Park. Ten miles south of the Park boundary is the Arapaho Glacier, which is one of the largest glaciers in the district. Just south of the Park boundary, not more than a half mile as the crow flies, are the two St. Vrain Glaciers. The eastern slope of the Divide is dotted with lakes as plentiful in number as the district in the vicinity of Long's Peak and Hallet Peak, while the western slope is richer in scenery than is the western slope of the Divide inside the Park. As a matter of fact, the entire area from the present Park south to and including Pike's Peak, in the vicinity of Colorado Springs, should be thrown into a national park and developed to the highest possible degree for the use of the public.

This stretch of territory is almost entirely scenic in character, and while it possesses fairly large forests, is so broken in contour as to reduce materially the commercial value of the standing timber. There is a material percentage of the population of the United States that is in real and serious need of a public playground where they can forget for the time the sweltering heat of the Middle West. These people turn instinctively to the cool heights of the Rocky Mountains which are within easy striking distance. Nothing, therefore, could be more logical or more fitting than that a Federal Government, which boasts of the fact that it is operating exclusively on the *pro bono publico* theory, should take steps to develop this one of its national assets, at least to that degree which would make it available for the great population that needs it most. Whether or not those to whom votes are as precious as poverty to a pawn broker can be led to snatch a side of bacon from the pork barrel with which to grease the wheels of justice, is a question of grave doubt, but if this cannot be done, at least steps should be taken to further the present wise policy of the Secretary of Agriculture to develop the recreation resources of the National Forests. As a matter of fact, so long as the National Forests are not entirely within the boundaries of the National Parks, there are going to be those who will

wish to enjoy their outings in the National forests, and now that we have a Park Service Bureau, it would seem that the time has come when some sort of sensible co-operation should be established between that Service and the Forest Service. The latter is bound, by the sheer nature of things, to be called upon to protect tourists in

their pursuit of insouciant pleasure in the wilds, no matter how many national parks we have or how well they are advertised and administered. When this fact is thoroughly recognized and a practical basis of coöperation is established, there will be a vote of thanks coming to someone from every one concerned.

Little-Known Forest Products

IN addition to the ordinary uses of wood with which we are familiar, mankind is dependent upon the forest for a variety of products whose appearance does not indicate their origin, say members of the Forest Service. Numerous as these products are, and as extensive as is their use at the present time, science is constantly learning new constituents which enter into the make-up of wood and is finding new uses to which these constituents and those already known can be put. Powder for munitions or blasting, disinfectants for protection against contagious diseases, and artificial silk for clothing are among the products obtained in whole or in part from wood.

Charcoal, as everyone knows, is essential for the manufacture of black powder. All of the acetone used as a solvent in making nitrocellulose powders is derived from acetic acid, a product of hardwood distillation. Great Britain, it is said, is dependent upon the United States for acetone used in making cordite. Black walnut is a standard for gunstocks, and has been so much in demand for the past two years that our supply of this valuable wood has been considerably reduced and other woods, notably birch, are being substituted. From Europe comes the complaint that there is a shortage of willow for making wooden legs.

Pure wood alcohol is the only substance which can be converted commercially into formaldehyde, which is universally used for disinfection against such contagious diseases as smallpox, scarlet fever, and tuberculosis. The experts at the Forest Products Laboratory have conducted extensive experiments on the production of grain or ethyl alcohol from wood and have been successful in experimental work in raising the yield and lowering the cost of production. If this process can be put on a commercial basis, the foresters say, it will result in putting the millions of tons of coniferous sawdust and other material which is now wasted every year to a profitable use.

By converting cellulose, one of the elements of wood, into a gelatinous material, known as viscose, a wide field is opened up for the utilization of wood waste, and a new line of products, varying all the way from sausage casings to tapestry, is added to the already lengthy list. Many of the so-called "silk" socks, neckties and fancy braids now on the market contain artificial silk made from wood.

About nine-tenths of all the paper which we use is made from wood. Besides the detailed investigations

of the methods of making newsprint paper, and of the production of paper from woods hitherto unused for that purpose, which have been conducted, kraft paper, which compares favorably with the best on the market, has been produced experimentally at the Forest Products Laboratory from longleaf-pine mill-waste. This kraft paper is brown in color and is very much stronger than ordinary papers. It is used for a variety of purposes, and, cut into strips, is spun or twisted into thread which is then woven into onion and coffee bags, matting, suitcases and wall covering, similar to burlap, and furniture closely resembling that made from reeds, as well as other articles of common use.

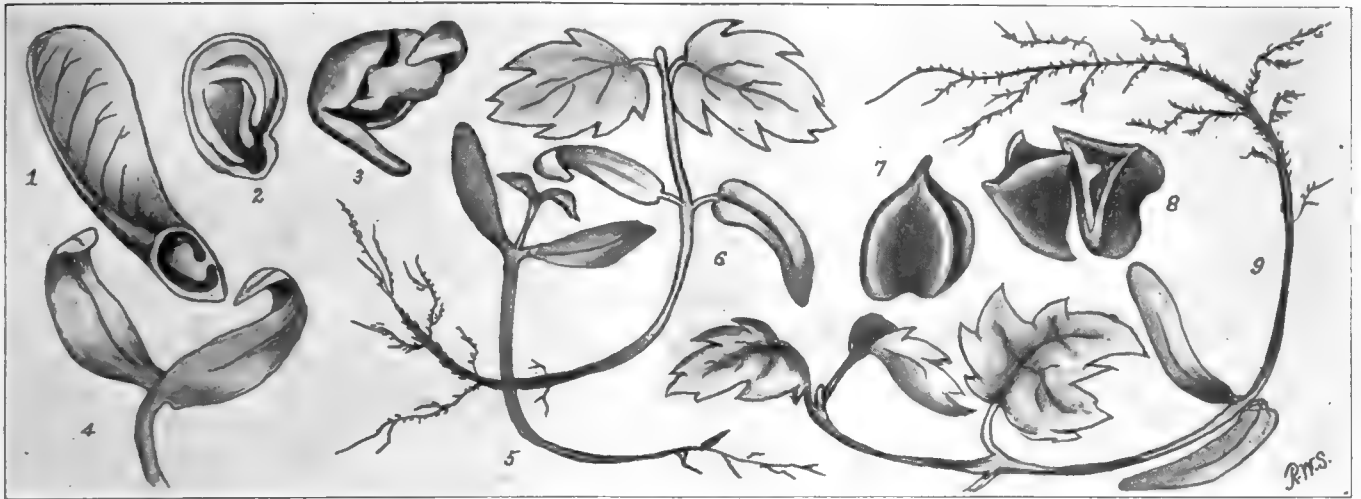
Within the past year the Forest Products Laboratory has, by coöperating with manufacturers, succeeded in getting a dye made from mill waste of osage orange put on the market as a substitute for fustic, which we import from Jamaica and Tehuantepec.

These are only a few examples of the various lines of work carried on at the Forest Products Laboratory, say the men in charge. Other activities, ranging all the way from the study of decay in wood to that of the resistance of wood to fire, are in progress, and new discoveries are constantly being made. Incidentally, the Forest Laboratory, at Madison, Wisconsin, was the first of its kind in the world and is probably still the best equipped. With the possible exception of Germany, no other country has done as much as the United States systematically to investigate the possibilities of its forest resources.

AS a result of recommendations of the Secretary of Agriculture, based upon approved classification reports submitted by the Forest Service, 19,840 acres of land have been eliminated from the Routt National Forest in northwestern Colorado by a Presidential proclamation. This action is in accordance with the policy of putting all lands in the National Forests to the use to which they are best suited.

THIRTY-SEVENTH ANNUAL MEETING

The 37th annual meeting of the American Forestry Association will be held at Washington, D. C., on Thursday and Friday, January 18 and 19, 1917. All members are urged to attend.



THE GERMINATING PLANTLET

1. One wing of maple seed, opened lengthwise to show position of seed in its pod. 2. Maple seed enlarged, showing the forming of the very earliest stage in the coming plantlet. 3. Another enlarged seed, with the coming plant further along. 4. The first pair of leaves after the plantlet comes above the ground. These first leaves in all plants are called *cotyledons*. 5. Shows the initial stemlet extending beyond the cotyledons, and the first minute leaflets developing. 6. The same plant later on, and 9, where the second pair of leaflets develop at right angles to the first pair. 7. Seed of beach tree, about natural size. 8. The same, bisected horizontally to show the earliest stage of the germinating tree.

Studying Plants in Winter

BY R. W. SHUFELDT, M.D.

Editor of the Department of Flowers

BEFORE touching upon the subject to be dealt with here, the very interesting and important one of studying our flowering trees and plants during the winter months, I desire to invite attention to the head-piece and its legend, which appears at the beginning of the article. This has been entitled "The Germinating Plantlet," and is the first of a series of such cuts, of which one will be thus introduced each month. One of the most difficult things for the young or amateur botanist to master are the terms employed in botanical works in the descriptions given wild flowers. This list of terms, or nomenclature of flowers and plants, is a very formidable one, and one that has discouraged many a grown person as well as young people from seriously entering upon the study of wild flowers or taking up botany at all. This is a great pity, and it will be my aim during the months following to overcome, as far as possible, this difficulty.

When a sage of yore remarked that there is "no royal road to knowledge," I am convinced he must have had the study of wild flowers in mind; for surely botany as a science absolutely bristles with an almost endless terminology, for which there are but very few common English names, or, as we term them, vernacular names. A good example of this is seen in the cut at the head of this article, in No. 4, where I figure the *cotyledons* (cot-y-le-dons) of a germinating plant. There is no common name for this pair of cotyledons, and it is im-

possible for one to write and talk about germinating plants unless the term is used. And so it is all through the study of wild flowers. I feel sure that the way I have selected to help the reader to master the common terms in botany will be accomplished as above pointed out. The plan will tell with ever-increasing usefulness as month after month this *illustrated glossary* will appear. For example, next month this head-piece may present the parts of a flower—an average flower—and the names of those parts. This may be followed another month with figures and names of the principal type-forms of the leaves of wild flowers, or maybe the terminology of the different kinds of roots that wild flowers have, and so on. My hope is that this scheme will be found very useful and helpful to teachers, and to others who may use the articles in classes of young people and others taking up the study of wild flowers.

There is a great deal to learn about plants, trees, and shrubs, in addition to the mere florescence or the *blooming* of flowers, but this matter will not be taken up here at the present time; it will be gradually introduced as various articles appear.

In that enormous strip of country constituting the northern part of the United States, south to an east and west line, forming the southern boundary, north of which the winters are sufficiently cold to check all plant and tree growth entirely, the sap running down in

ASK YOUR QUESTIONS

THE editor of this department will gladly answer questions of any member of the American Forestry Association regarding wild or cultivated flowers and there will be no charge for the answers.

Write the questions plainly and address them to

EDITOR, DEPT. OF FLOWERS,
American Forestry Association,
Washington, D. C.

the latter, and nearly all the former dying down to the ground. In this great area we have no wild flowers out-of-doors to study; but, on the other hand, when we go botanizing afield, we meet with no end of other material in this line for our consideration, and samples of all I have in mind of this should be carefully collected and taken home for study during the long winter evenings, when all the plants in the great open are asleep. Special attention should be devoted to the various ways in which the plants "go to seed," and their seeds and seed receptacles should receive our particular attention. Several illustrations of this will be dwelt upon in the present contribution, and there is, in part, no better example of what is to be brought out on this subject than what is seen in our "Common Green Brier" or *Smilax*. This plant is not only known and at once recognized by us, but it also is, in the parts of the country where it flourishes, likewise familiar to nearly every boy and girl. They know its shiny leaves well, and it is often called the "Bread and Butter Vine." Children have a habit of chewing the leaves when these first come out in the spring, and we all know of the strong, wiry nature of the vine, and the many sharp thorns it possesses, which so often impede our progress as we have occasion to go quickly through the woods, or anywhere where this

troublesome vine grows at all luxuriantly. Its beautiful little *greenish* flowers appear quite early in the spring, and are pretty well-known to good observers; next spring I trust to make them still better known. With the berries and seeds it is quite different, for comparatively few people go into the woods and fields when the berries are ripe, and when the leaves have fallen from this vine, leaving only the berries in evidence and the thorns. It is at

this stage that the growth is quite unknown to many—a fact I have convinced myself of through actual interrogation.

Now the *Smilax* family is a more extensive one than is commonly supposed; for as the *Smilacæ*, as the botanists give it to us, we find that no fewer than eleven species of this vine are described, with at least two varieties of two of the species. They are generally arrayed in two groups, and for our purpose here only a good representative of each group will be referred to. The common green brier, or horse brier, mentioned above is shown in Figure 1, while the one known under the not very attractive name of "Carrión Flower" is shown in Figure 2. Both of these were collected near Washington, D. C., late in October. Sometimes, as you go into the fields, or along the edge of the woods, you can recognize the common green brier as far as you can see it; for, as in the case of all vines of this group



THE COMMON GREEN BRIER

FIG. 1.—This very well represents a specimen as it appears when its seeds are first matured. It is the *Smilax rotundifolia* of the genus *Smilax*, which belongs to the Lily family or *Liliacæ*. It ranges from New England to the Gulf of Mexico, and southward to Texas. It is subject to marked variations in western examples.

its leaves turn in the fall to most beautiful shades of red, scarlet, and various tints of yellow, all the way from a rich orange to a pale lemon yellow. Certain highly colored spots break out upon these leaves, which still further tend to enhance their beauty. This exquisite turning of the leaves is common to all the different kinds of *Smilax* vines, and it is invariably offset by the marked beauty of the elegant little bunches of berries they bear at this season (Figs. 1 and 2). Each berry is borne upon a delicate little stalk, the entire bunch being generally a roundish cluster; this is well shown in Figure 2. They always remind me of a small edition of Concord grapes, as they possess the same bluish-black color, with a decided "bloom" spread over each berry.

In the common green brier the leaves are ovate or roundish, many of them being truly heart-shaped, though the botanists have called this vine *Smilax rotundifolia*, referring to its roundish leaves, while the carrion flower is known as *Smilax herbacea*. Of the latter Miss Alice Lounsberry, in her charming little work "A Guide to the Wild Flowers," says: "In the season of its bloom

the odour of this plant serves to identify it with one of its common names. As the flowers fall, however, it becomes less obnoxious, and is one of the first to foretell by its rich, changing colouring the approach of the autumn. Its

near relative, *Smilax rotundifolia*, is not so partial to moist soil, and is well known along the roadsides and fields."

The stem of this vine is smooth, and has not the "prickles" of the common green brier. Both are erect and climbing. I am thus particular with the two chosen

species of these two groups, for I desire to record enough here to be absolutely sure of the difference when they are met with in nature. This great principle holds in our studies in every department of natural science, and it was continually brought before the classes in botany at Cornell University, where not only I but hundreds of other students had this principle instilled into our minds through the teachings of that great master of the science, Dr. David Starr Jordan, who at that time was a tutor there in that branch of nature work. "Compare, gentlemen, compare; for comparison is the key to a natural classification," he would say; and I may add that the classification of flowers is in no way different from any other kind of classification, as that of watches, cameras, or pistols. It but brings *things* into an orderly and natural arrangement, in that the knowl-



BERRIES OF THE CARRION FLOWER

FIG. 2.—This is another *Smilax* (see Fig. 1) found in the wet lands and on the banks of rivers and small streams. Ranges from New Brunswick and Manitoba to Texas. Exhibits great variability. Easily recognized by the unpleasant odor of its flowers in the spring. This is *Smilax herbacea*.

edge thus acquired may be duly stored away in the mind for future use.

There is another vine which we meet with everywhere in the woods at this season, and long do its leaves remain

green and fast to the great masses of stems—wildly running stems—that bear them. I refer to the Japanese Honeysuckle (*Lonicera japonica*). Next summer I will give a beautiful photograph of this vine, but right here I desire to show that it, too, bears black, shiny berries in the fall (most honeysuckles bear red or orange berries); but see how different these berries are from the ones borne on the Similax vine. They have not the "bloom" upon them, nor are they borne upon the extremities of little stemlets. This is a good thing to know; and, as I say, we will take up this favorite flower again, for it is worthy of a much fuller description, with a few lines on its place in the flower-system in nature. I must be in a *spring mood* in order to describe honeysuckles, for they stand among the most beautiful flowers that embellish the roadsides and woods at that season.

In some of the old pastures in the winter-time, when the dead vegetation is all covered with the untrodden and glistening snow, one may see, in scattered groups and ranging in height from a yard to five or six feet, such curious-appearing growths as the ones I show

in Figure 4. These are called "Gypsy Combs" and a good many other fancy names, while they really are the dried and dead heads of the wild or common Card Teazel (*Dipsacus sylvestris*). They are given natural size in

the figure; and were we to follow their stems down, it would be seen that they branch in two and twos from a common point on the main stem; here, too, a pair of the narrow, lancehead leaves are found. In the spring the tiny purple or lilac flowers are densely packed in be-

tween these hard, stiff-pointed structures that form the cylindrical heads shown in my photograph. This Teazel represents the *Dipsacaceæ* or Teazel family, and there are not many representatives of it in this country, although three genera have been created to contain them.

There are nearly sixty different kinds of Goldenrod in the flora of the United States, all being contained in the genus *Solidago*. The common forms are well known to any observer of flowers in nature. Next summer I shall touch upon the most prominent species of this group, while in the present article I show how a Goldenrod appears when it goes to seed in the autumn; there are two species shown in the cut.

It will be noticed that in the one the locust is resting upon, the separate stems bearing the flowers do not run up into a point, but are

nearly all in the same plane at their upper ends. Sometimes this variety is found in full flower when it is no more than a foot high, while I have seen specimens of it that had grown to be about four feet high. Scientifically,



THE HONEYSUCKLE FAMILY

FIG. 3.—This is designated as the *Caprifoliaceæ*, a small group of interesting vines, often bearing very fragrant flowers. The specimen here shown is of the Japanese honeysuckle (*Lonicera japonica*); it will be noticed that its berries are black and not red or yellow, which is the case with our American Woodbushes or honeysuckles. The Japanese honeysuckle was introduced into this country from Asia, and it is now extremely abundant from New England to Florida, especially along highways and byways. It is the honeysuckle of the roadside. The fragrant flowers are white, pink, or yellow.

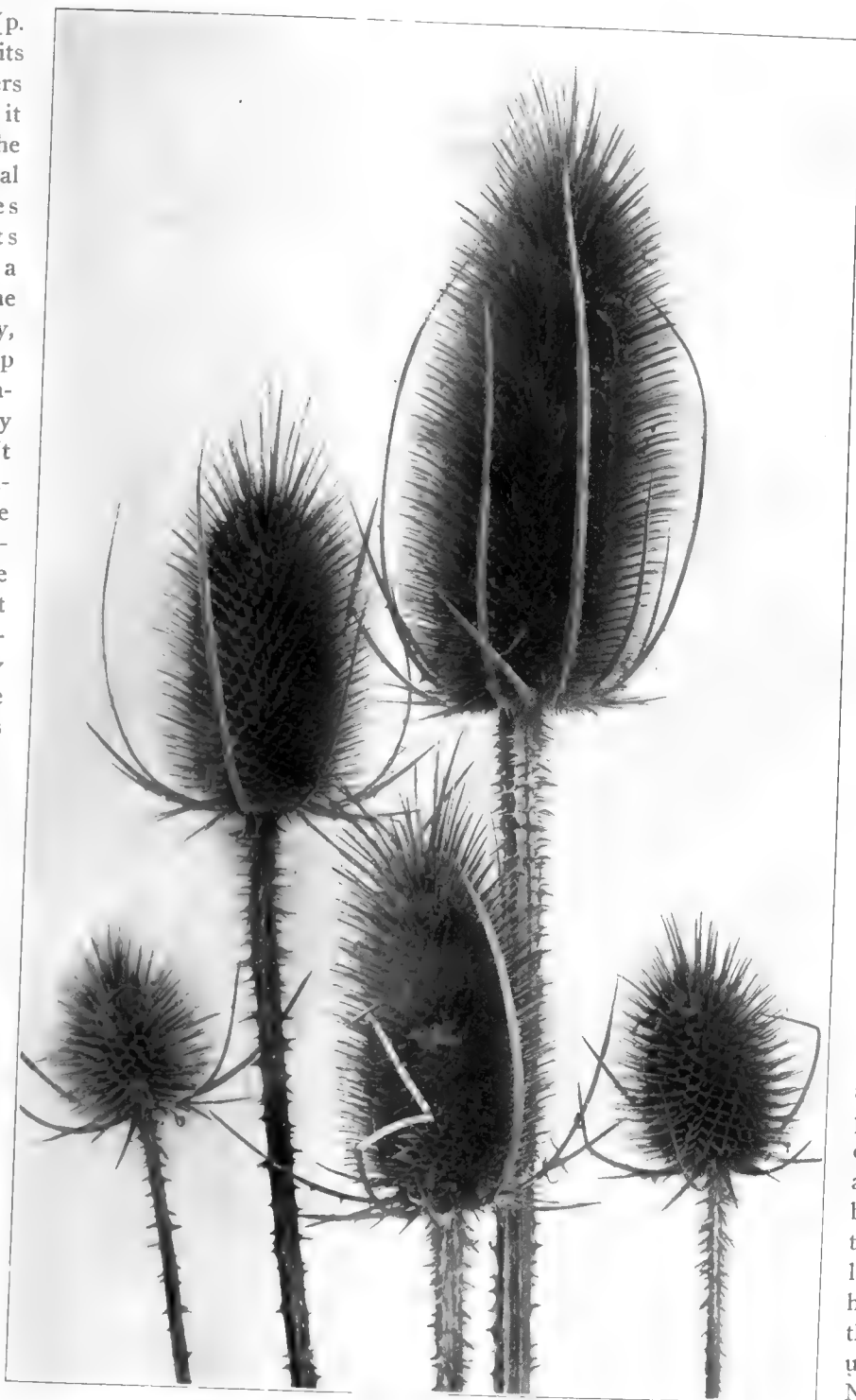
this Goldenrod was formerly known as *Solidago lanceolata*; but it has now been removed to the genus *Euthamia* of Nuttall, and in the last edition of Gray's Botany it stands as *Euthamia grammifolia*. (p. 797.) One of its principal characters is the fact that it is flat-topped; the ends of the several flower bunches composing its plume are, as a whole, in the same plane superiorly, and not brought up in a conical fashion, as in so many other species. It has several common names, as the Lance-leaved Goldenrod, and the Bushy or Fragrant Goldenrod. Another character by which it may be identified in this most puzzling assemblage of plants, is that its leaves are lance-shaped; the form they assume is well shown in Figure 5 of the present article, where, too, it is seen that their edges are smooth and even, or not toothed. In color they are a light green, with from three to five ribs running the whole length of them.

The terminology for leaf-description will be given pretty soon in one of my articles, when it will be much easier to comprehend the meaning of the terms commonly used by botanists everywhere in order to describe

these very important structures in the vegetable world.

Throughout the Middle Atlantic States this Lance-leaved Goldenrod flourishes from July to September, being found principally along river and creek banks, along roadsides, and, in some instances, growing so luxuriantly as to almost entirely fill an extensive low meadow, extending, perhaps, from stream to stream.

The Goldenrod standing next to this, on the right hand side of the picture (Fig. 5), is a specimen of the Yellow-weed or Canada Goldenrod (*Solidago canadensis*). This is probably the most abundant of all in this elegant assemblage of flowers, and it is found from British Columbia and eastward, and southward to include the Floridan peninsula. It is a tall, stoutish plant, with a leaf that, when typical, is quite unmistakable; they are pointed at both ends, rough above and rather woody below, with saw-toothed edges. This latter character is, however, absent in the leaves highest up on the stems. Note that in the Canada Goldenrod the flower-bunches are so arranged that they, as a whole, form a pointed pyramid with the summit above. Finally I may say of the leaves that they are



THESE HAVE A DECIDEDLY PRACTICAL VALUE

FIG. 4.—The Teazel family (*Dipsacaceae*) is a very small group in this country, including but three genera and a few species. We see here the "combs" of the common, wild card teazel (*Dipsacus sylvestris*), an interesting and important plant in not a few particulars. It is rare in the United States and therefore is not used commercially. In the western parts of England the teazel heads are used in the manufacture of woolen cloths of various kinds, that is, they are used to "raise the nap," and they answer this purpose far better than any tool that man has as yet been able to make. Metal ones tear the material, whereas a card teazel head, such as we see in this illustration, when seriously obstructed during the nap-raising process, breaks, and, as I say, thus saves the fabric from being torn. They were brought by the ton into England before the war from France and Germany, and there is no reason why these card teazels should not be raised for the same purpose in the United States, where woolen goods are so largely manufactured. They use them by simply scraping the thorny stem to make a handle, and then the natural tool is ready for use. Cattle will not browse upon this plant, as often even the upper surface of the leaves is covered with prickles that would tear the tongue of a browsing animal. The bases of the upper leaves grow together, and in the pocket thus formed the rain and dew collect. Country people will tell you that this is a "sure cure" for warts. It is a good place to collect small insects, these Venus's Cups or Basins. Indeed, there is much more to be said about the head of a card teazel, for which there is not sufficient room here.

a dull olive green; and if you look sharp, you will see that each leaf is triple-veined, or triple nerved. That is, there are three veins, as they are called, to the leaf, and they run from point to point on each, or, as we may say, from the stem extremity to the distal apex. Usually, the flower-heads are not very large, and the tiny flowers composing them may be said to be of rather a greenish yellow color; on the whole they are of a spreading type, as may be seen in the illustration.

Do you ask me which I take to be the most beautiful, the daintiest, and the most attractive of all this great host of Goldenrods that our country is favored with? My choice is easily made; and I feel quite sure that those who are at all familiar with these plants will readily agree with me: it is the graceful little *Solidago casia*, the Blue-stemmed or Wreath Goldenrod, also called the Woodland Goldenrod. Later on, I will present here a reproduction of a photograph of this artistic little species, and you will be able to note that, unlike most of its family, it does not head up like the average members of the group. The flowers are in limited, oblong clusters, situated at, or rather springing from, the insertions of the leaf-stems, or where the leaf-stems spring from the main plant-stem. The latter are usually arched for their continuity, and of a distinctly

bluish or purplish hue—hence one of its common names, the Blue-stemmed Goldenrod.

This Wreath Goldenrod is quite abundant in some regions, and is usually found on shady banks, or along edges of shady woods. Often I have found it growing at the sides of paths that run through the woods, where its bright yellow flowers and arching, bluish stem are sure to attract attention.

But this is all we can say about our Goldenrods just at present—and, as stated above, they will be taken up again in some later issue of AMERICAN FORESTRY.

Before closing the present article, however, it will be as well to say a word in reference to what may be touched upon along other lines, as we pass more extensively into this subject of the study of our wild flowers. Already I have been interrogated as to the best field or handbooks the student should have in order to extend the information to be given in the present department. One or two of these have been mentioned and quoted from in this and a previous article here, and later on it may be that other works will be cited; requests should especially come in



THE GOLDENRODS

FIG. 5.—One of the most difficult families of all the flowers to study and identify are the Goldenrods or the *Solidago* group. Two species gone to seed are shown in this reproduction of one of my photographs. Some of the species may grow to be eight feet in height, with gorgeous golden plumes surmounting the top. There are several groups of Goldenrods, including over eighty species of plants. They will be taken up more in detail next year when the plants are in flower. Specimens should be pressed and sent in from all parts of the country for identification. The insect shown in the cut is the American locust (*Schistocerca americana*), often injurious in the South.

to that end. No one can study systematically, much less advantageously, our wild flowers unless by the aid of one or more authoritative text-books on the subject.

Such books may be strictly scientific, as the last edition of Gray, to which reference has already been made; or they may be partly scientific and partly popular, and we will find a number of these in our libraries.

In purchasing books of this latter class, one should be certain that the author has not sacrificed accuracy to insure a popular handling of the subject; for it is better to have a limited knowledge of a thing so long as it is *accurate*, than to store one's mind with a great mass of undigested, unclassified, and unreliable stuff, which can be of no use to its possessor, and only reflect discredit upon one, when one chances to use it in the presence of those who command a better knowledge of the subject, founded on fact and bearing the trade-mark of truth. Patient study in the field and in the work-room, with the aid of the last editions of authoritative text-books, will insure this knowledge, and the student will have the satisfaction of knowing that progress is being made along substantial lines of inquiry and research.

Great confusion often follows on the use of terms and on the real meaning of those terms. This danger is well seen in the *naming of colors*; in the description of forms or shapes; in the estimation of proportions, and in determining lengths and heights. Of recent years, great progress has been made in the matter of having a uniform system for the naming of colors in science, be the department what it may. This has chiefly been

brought about through the work published by Prof. Robert Ridgway, curator of the Division of Birds, of the U. S. National Museum. Professor Ridgway gave his untiring attention to this subject for many years, finally publishing his admirable treatise on the "Nomenclature of Colors," in which we find plate after plate of schemes consisting of little parallelograms of color-tints, with names for every possible shade occurring in nature. Although this was primarily compiled for ornithologists, the world did not allow it to rest there very long; the book is used all the way from a silk factory to descriptive literature in every line of human activity, where the uniform naming of colors becomes necessary. Such a work is particularly useful in botany, where color means so much, and is referred to so often. For example, were I to describe a flower as being simply yellow, what kind of impression would I convey, when we have some thirty or forty different shades of yellow? Yellows, as in the case of any other color, run all the way from white to black, with the faintest possible shade of yellow at either end of the sequence. But if we aim to name the *exact shade* of yellow meant, all we have to do is to take the part of the flower, be it petal or autumn leaf, and match it with the yellows of the manual above referred to; then use the name of the discovered shade or tint for the shade of the actual flower or leaf in our spoken and written descriptions.

RECORD FOR RAPID GROWTH

BY D. T. MASON

Professor of Forestry, University of California

WHILE the senior class of the Division of Forestry of the University of California was doing field work in the famous Del Monte Forest during the past summer, a very rapid growing Monterey pine (*Pinus radiata*) was discovered. This pine is the most rapid growing conifer which the writer has seen. The tree had been killed by insects presumably and cut for cordwood. A section about ten feet above the ground showed the following diameters the inside bark attained at the end of various ten-year periods:

10 years	15.0 inches
20 years	34.1 inches
30 years	46.5 inches
40 years	51.2 inches
46 years, total age	52.4 inches

In addition, the bark would add approximately three inches to the diameter of the tree at this point. The tree at breast height was about 58 inches in diameter. Its height was about 100 feet. It contained approximately 750 cubic feet of wood and bark, or about $8\frac{1}{3}$ cords of wood.

As shown in the illustration the rings are very wide; during the period of most rapid growth some of them are over 1.5 inches in width; thus in some years the tree grew more than three inches in diameter. The Monterey pine is a short-lived, rapid-growing species which occurs in



A QUICK GROWER

This tree gained a diameter of nearly four and a half feet in the forty-six years of its life. In some years the growth was as much as three inches.

forests only within four or five miles of the ocean on and in the vicinity of the Monterey peninsula, about 125 miles south of San Francisco. The soil on which this particular tree grew is deep sand. While the rainfall averages only about 18 inches annually, the large amount of atmospheric moisture, mainly in the form of fog, together with a very long mild growing season, encourages rapid tree growth.

The Ancient "Cedars of Lebanon"

By GUY E. MITCHELL

THE great Cedars of Lebanon are among the most interesting living records of the past. The grove which is standing to-day is the remnant of the same forest from which the cedars were cut and hewn for the building of the Temple at Jerusalem by Solomon. There

them were undoubtedly living at the time when the timbers of their immediate predecessors supported the Temple. They are upwards of 2000 years old, not so old as the great Sequoias of our Pacific Coast, but still very ancient. At present there are only about 400 trees left, all very large and old. The best preserved are about 100 feet high and one has a circumference of 47 feet. The grove is now protected by a well-built, high stone wall; but all the balance of the great cedar forest of Lebanon has succumbed to the greed of man, and the grove stands like an oasis in the desert.

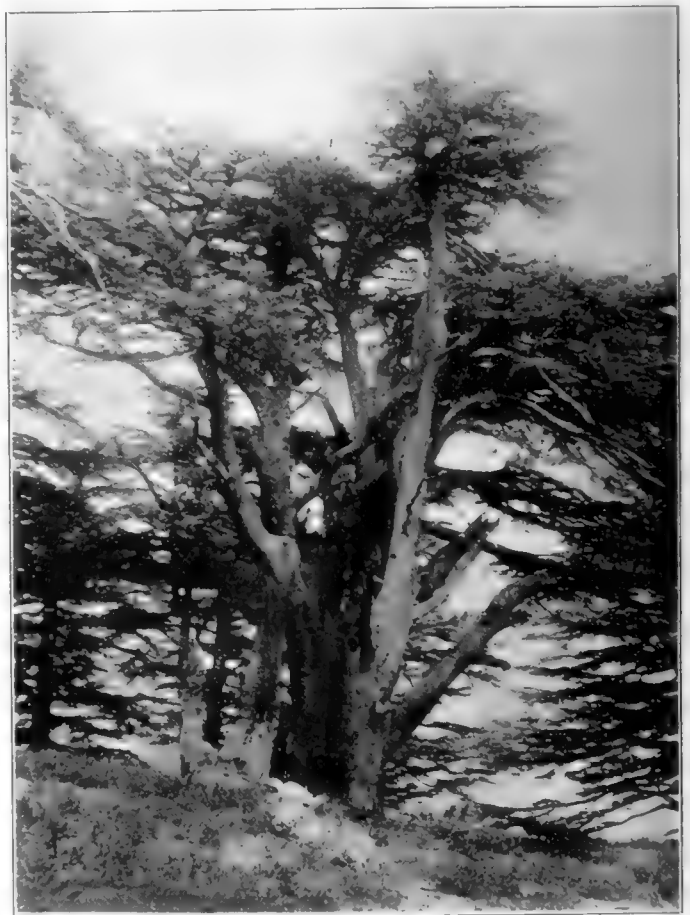


BRANCH AND CONES OF ONE TREE

Soil hard, vigorous and fruitful, these old cedars of Lebanon continue to thrive although most of them are now, it is estimated, over 2000 years old. This branch and cones were taken from one of the oldest.

are many references to the Cedars of Lebanon in the Old Testament, the most notable in First Kings, where it is stated that through the coöperation of Hiram, the King of Tyre, Solomon brought great rafts of cedar from Lebanon to Joppa and carried them up the steep mountain-sides to Jerusalem for the first temple. In the building of the second temple, under Ezra and Nehemiah, the timbers were procured from the same cedar forest on the slopes of Mount Lebanon. At an earlier period the Psalmist refers to the Cedars as the ornament of Lebanon and one of the great glories of God's creative power and wisdom. Pliny, the Greek naturalist, named the species *Cedrus magna*, meaning "great."

The impressive thing about this ancient grove of cedars is the knowledge that the oldest and largest of



GIANT CEDAR OF LEBANON

The largest cedar in the grove of the cedars which furnished timber for Solomon's Temple at Jerusalem. There are now only about 400 trees left, all large and old. The best preserved are about 100 feet high and have a circumference of 47 feet.

In considering the otherwise absolute destruction of the forest over the entire mountain-side, one cannot help but wonder why this group has been preserved. A probable explanation is found in the name of the stream at the foot of the mountain—the Kadisha—which rises in the moraine left by the great glacier which swept down from the summit of Lebanon and on which the Cedars of Lebanon thrived during early Biblical times. This word is the

Hebrew for "holy," and the grove has undoubtedly been preserved because of its sacred character. The natives to-day will tell you that the grove is sacred because it "was planted by Jesus Christ,"—a belief which finds the semblance of justification from a poetical passage in the 104th Psalm referring to "the Cedars of Lebanon which the Lord has planted."

As the traveler stands on the summit of Lebanon, nearly 10,000 feet high, and looks down upon this ancient grove, the remnant of a mighty forest, and upon the still more ancient glacial moraine upon which it grew, and sees upon the flank of Lebanon the ruins of ancient temples and the vast expanse of the Mediterranean beyond, and to the east the distant ruins of Syrian Baalbek, he may recall the force of the words of Holy Writ, "all flesh is grass and

as the flower of the field it perisheth." Over this expanse, witnessed by these trees and their immediate predecessors, have come and gone all the great nations of antiquity. Here are the relics of the Assyrian, the Babylonian, the Egyptian, the Phœnician, the Greek, the Roman, the Moslem, but yesterday, as it seems, the Crusader, and now the warring Turk and Slav. And each has done, and perhaps to-day is doing, his part to destroy the mountains' noble covering of forest and to add to the desolation wrought by his predecessor. Could the process but be reversed, and the greed of man restrained and protection be given to the reforestation of the region, the Cedars of Lebanon might again become, as in the days of the Psalmist, the glory of the mountains.

Another Imported Tree Disease

ANOTHER of the several imported tree diseases, and one recently discovered in this country, is described by Dr. George C. Hedgcock, of the Office of Forest Pathology in the Bureau of Plant Industry, in the current number of *Mycologia*. Doctor Hedgcock states that the poplars of this country are threatened by a dangerous fungous disease which has evidently been imported from Europe. This is the European poplar-canker, a disease which attacks the twigs, limbs, and trunks of the black and Lombardy poplars (*Populus nigra*) and of the Carolina poplars or cottonwoods (*Populus deltoides*), and may be expected to attack other species of poplars and cottonwoods in regions not yet investigated.

This disease is caused by the fungus *Dothichiza populea*. It occurs first in the form of cankers or depressed dead areas in the bark much in the same manner as in case of the blight of chestnut trees, which is, however, caused by a distinctly different fungus. The effect of the fungus on poplar and cottonwood trees is as follows: cankers are formed at the point of attack, spread rapidly and often girdle the twig, limb, or trunk at the point of attack, killing the part above the canker. Trees attacked on the trunk become "spike topped." The death of limbs and twigs gives the trees a ragged appearance, which spoils their beauty, and later kills them. This is especially the case with black poplars which are frequently planted in rows along boulevards and avenues.

The European poplar-canker is most severe in its effect on stored and transplanted nursery stock. Trees when in transit, and when heeled in the ground, or freshly transplanted in the spring, are readily attacked by the fungus and ruined within a very short period of time. This disease is spread by means of spores produced in pycnidia

or fruiting bodies in the form of small pimples or pustules in the bark of the cankers. From these pustules in spring-time there are exuded small, sticky, cream-colored tendrils which soon change to a tawny olive or even a walnut brown. These tendrils contain millions of spores which spread the disease in various ways.

The fungus-causing European poplar-canker was first found in Troyes, France, and described in 1884. In 1905 the first serious outbreak to be noted was reported and the disease described by the French pathologist Delacroix. An outbreak of the disease in Italy was reported in 1907. This disease was first reported in America by a correspondent of the Plant Disease Survey in 1915, from Massachusetts and New Hampshire, but the causal fungus was not correctly identified. During the present year the disease was found prevalent in small areas in certain districts in the following states: New Hampshire, Massachusetts, Rhode Island, Connecticut, New Jersey, Pennsylvania, Delaware, Maryland, Ohio, Nebraska and New Mexico. The centers of infections appear to be in every case either certain nurseries now known to contain diseased trees, or points where poplars received from such nurseries have been planted. As this disease was not known in the United States till recently, it is evidently an imported one, and must be dealt with as such, if it is dealt with at all.

Conservationists may well pause to inquire how long the merry game of importing tree diseases is to continue. The chestnut is gone: the white pine is going: the gypsy moth continues to enlarge its territory. Is the entire importing nursery trade worth the damage it has already caused to more substantial interests?

Nominate Friends for Membership
See Blank Under Table of Contents

Explanation of the G-Trees

MR. W. R. MATTOON, of the U. S. Forest Service, who has recently spent several months studying second-growth stands in the southern pine belt of longleaf and slash pines, furnishes the following explanation regarding the peculiar G-shaped trunks of pine illustrated on page 423 of the July number of AMERICAN FORESTRY.

"It is not uncommon in second-growth longleaf pine to come across trees with a striking G-form section of the main stem. The crook usually starts at a point from 3 to 7 feet above the ground, and after more or less of a half circular sweep terminates in an upward growing stem at a point located roughly over the initial point in the basal portion of the tree trunk. The explanation lies in the death of the central terminal shoot and the sub-

aided by the increasing weight of the growing stem. In perpetuating itself by means of a lateral branch, slash pine (*Pinus caribaea*), formerly called Cuban pine (*Pinus heterophylla*) by the U. S. Forest Service, makes much less of a curving trunk, due undoubtedly to its very

much faster growth. One such case is illustrated in an accompanying photograph.

"The dying of the central terminal stem may be due to any one of several causes, including fire, insect attack, and wind as the most common agencies. Occasionally large sized groups of saplings or small pole trees are thus found topped off in the path of a tropical hurricane. The Nantucket tip moth (*Retinia frustrana* Scud.), which sometimes does much harm to the young growing stems of shortleaf and loblolly pines, seems to



HOW THE G-TREES FORM

The contorted branches show the tendency of this permanently deformed longleaf pine to develop a vertical growing stem.



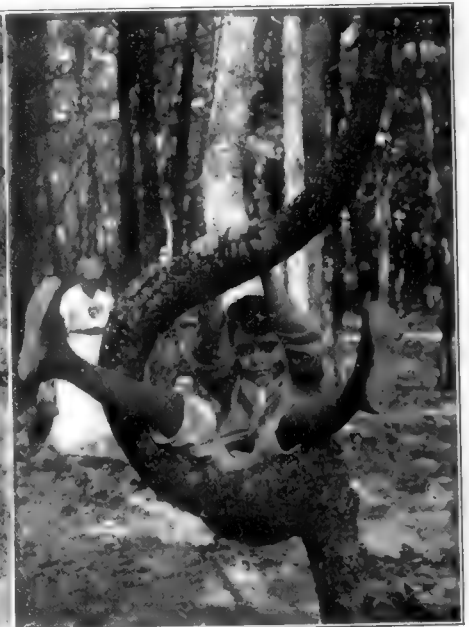
G-TREE OF NORTH CAROLINA.

The photograph of this specimen was taken by P. T. Kneass, agent of the Woodland Lumber Company at Pine Bluff, N. C., near Princeton, North Carolina, in 1912. There were a number of similarly deformed trees in the vicinity.



ONE FORM OF THE G-TREE

By the substitution of a lateral branch for the killed central stem, this slash pine, in about 5 years, has attained a height of 18 feet and a diameter of 6 inches at breast height.



A WHITE PINE G-TREE

Harry D. Tiemann, of the Forest Products Laboratory, at Madison, Wisconsin, sends this photograph of a white pine of G-tree shape on the banks of the Wisconsin River near Kilbourn, Wisconsin.

sequent effort of the tree to replace it by substituting one of its laterals or side branches.

"Because of the slow-growing, flexible character of its laterals and their characteristic nearly right-angular forking, sometimes even forming a very acute angle downward with the main stem, longleaf pine is particularly successful in developing well-rounded G-shaped substitute tree trunks. The full curving of the stem is

accomplish very little injury to the large, well-protected "asbestos" bud of longleaf pine. In isolated cases a freak in burning would no doubt act as the initial cause for the peculiar later development of the tree trunk. An outbreak of some girdling insect working on saplings at about a uniform height above the ground or a severe wind storm offers the most likely explanation for the occurrence in the July number of AMERICAN FORESTRY."

First Aid To Wounded Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

By J. J. LEVISON

City Forester of New York City

Simple Methods of Preventing and Treating Injured Bark—a Suitable Work for the Winter Months

EVERY owner of an estate with trees on it has the problem of tree wounds to consider. Every city has streets with horse-bitten trees on them and everyone owning even a single tree may some day find its bark injured by the milkman's horse, by the neighbor's automobile or by some mischievous school boy.

When the bark is thus injured, a tree can no longer produce the proper amount of foliage or remain in a healthy condition very long. The reason for this is clear when we stop to consider the nature of the most important

tissue of a tree—the “cambium layer”—and note how it becomes affected by such injury. The cambium layer is a thin tissue located immediately under the bark. It must completely envelop the stem root and branches of the tree. The outer bark is a protective covering to this living layer, while practically the entire interior wood tissue is composed of dead cells and merely serves as a supporting skeleton for the tree. The cambium layer is the real growing part of the tree. It is the principal part which transmits the sap from the base of the tree to its crown; it is the part which causes the tree to grow by the formation of new cells, piled up in the form of rings around the heart of the tree, and it is also the part which prevents the entrance of insects and disease to the inner wood.

From this it is quite evident that any injury to the bark and consequently to the cambium layer just beneath it will not only cut off a portion of the sap

supply and hinder the growth of the tree to an extent proportional to the size of the wound, but will also expose the inner wood to the action of decay.

It may be a small wound and may appear unimportant, but if neglected it will soon commence to decay and carry disease and insects into the tree. The tree then gradually becomes weakened, hollow and dangerous, and its life is doomed unless repairs are made.

If the wound is dressed in time recovery is certain; or if a suitable guard had been placed around the trunk

of the tree before the injury occurred, serious damage could have been avoided.

The most serviceable guard is made of wire netting, ½-inch mesh, No. 16 gauge and cut to a height of six feet. There are many other forms of tree guards used; some more elaborate and expensive than others, but none more efficient. The wire netting guard has the advantage over the others in adapting itself to the tree when it grows in thickness.

In spite of efforts to protect the bark of trees, bruises, cuts and tears occur, and in all such cases the wound must receive immediate and careful attention. Any attempt to force the loose bark to grow back to the tree will fail. In dressing the wound the rough edges of the injured bark should be cut smooth and the exposed wood covered with coal-tar. Coal-tar by itself or in mixture with creosote has an anti-septic as well as protective influence on the exposed wood. Not only for these



CAUSED BY A HORSE BITE

This tree, unprotected by a wire guard, was first injured when a horse chewed the bark. The owner of the house whose front porch it shades could have healed the wound by using a few cents' worth of coal tar and creosote, and putting up a guard. He failed to do so, the wound spread, disease attacked the tree, and this is its condition now.

reasons is it far preferable to paint for covering wounds, but also because it has the advantage of being more lasting and does not peel as paint does.

Some people bandage the bruise of a tree with burlap or cloth. This is not advisable because disease will set in more readily under the protection of a bandage than it would when the wound is freely exposed to the air. For the same reason the method of covering wounds with tin is equally bad.

When we consider the care required in the treatment of a tree bruise, does it not seem that we are expecting a great deal from the trees that we plant along our city streets? We plant them in a cement pavement, alongside of a deep set curb-stone, with more pavement on the street surface and leave them to draw food and water from the hard packed clay. Then the bark may be injured, the direct channel for sap supply cut off and still we expect them to survive and wonder why they do not.

Owners of trees who see their trees failing and do not know the cause often spend money needlessly in engaging some tree surgeon to treat it. Let us suggest to these people that they write to *AMERICAN FORESTRY*, describe the tree and its general condition as best they can, and advise as to what to do for it and what is affecting the tree will be given free of charge.



NEGLECT AND THEN DESTRUCTION

This once fine tree, first damaged by boys tearing off a strip of the bark, was neglected. No attention was paid to the wound and the tree gradually rotted until it became so weakened that it toppled over during a wind storm. The owner of the house, lamenting its loss, declared he would have given \$100 rather than have the tree destroyed. All he need have given was a few minutes' time and a few cents' worth of coal tar, and a wire guard when it was first injured.

ADVICE FOR DECEMBER

1.—In December fertilize with well-rotted manure all weakened or backward trees and all valuable specimens on the lawn. Dig the manure into the soil around the tips of the roots away from the trunk to the tree. Do not expose the roots and be careful not to mutilate the large roots.

2.—Bolt all trees that are likely to split. The old-fashioned band placed around the trunk or branch of the tree is bound to become too tight for it and eventually girdle it. Bolting is much better, and does not injure the tree.

3.—Commence cutting down all trees marked for removal during the early fall. Segregate the trees infested with boring insects and disease and see that the infested wood is burnt before next May. This applies particularly

to such trees as those infested with the hickory bark beetle in hickories, the two-lined chestnut borer in oaks, and the bronze birch borer in birches.

4.—This is a good season to look over your spraying apparatus and to see that the machinery and hose are in good order. You will need the spraying apparatus in early March on your apple and pear trees.

5.—Take care of neglected wounds on your trees, cutting off any loose bark and coating the exposed wood with tar. This will prevent decay and aid in healing the wound.

6.—Repair tree guards on the street and avenue trees. See that they are in good order and that they have not grown too tight for the tree during the past growing season.

QUESTIONS AND ANSWERS

Q. I have a Baldwin apple tree that has not yet come into bearing, which is four or five years old. This fall I have noticed in numerous places a little bunch of blue-white mildew, almost resembling a very small piece of cotton, and where this condition exists, there is a swelling of the branch. Can you tell me just what this is, and the proper treatment for it? During the summer the branches have increased in length to a great extent, the topmost branch of the tree now extending possibly 8 feet high, and the trunk is possibly 2½ inches in diameter. Should a tree of its age be pruned at this time?

H. E. P., Newark, New Jersey.

A. From your description I judge that the tree has been infested with plant lice and the best remedy would be to wash the

affected parts with a lime sulphur solution, one part of lime sulphur to ten parts of water.

If the branches have grown scraggly and very long, it is well to cut in lightly, making the crown more compact. This should be done in March.

Q. Can you give me advice about the bag-worm and the Tussock moth?

L. B., Indianapolis, Indiana.

A. The Tussock moth belongs to the Gypsy and Brown Tail moths and is among the most common in the eastern states. It spends its winter in an egg form, hatches in early June, the caterpillars feeding all of June and part of July, and transforming

into pupæ in July; the pupæ then change into moths. The female moth, a sluggish, wingless specimen, deposits its egg clusters on the bark of a tree, and then it dies, leaving the eggs to remain in the same position all winter.

The best method of combating the insect is as follows: The egg masses should be removed and burned any time from August to May. If the work is done on lawns, the scraping or removing of the eggs should be done over a canvas to enable gathering of the eggs and preventing them from hatching in the grass. On the streets, they may be scraped off on the asphalt and collected afterward. It is also important to be on the lookout for the eggs on fences and at the various other protective places in the neighborhood of the trees because they have a tendency to deposit their eggs on buildings, fences, posts, etc., as well as on the trees.

Another way of combating is to spray the infected trees early in July with arsenate of lead. The idea is to poison the leaves so that the caterpillars feeding on the poisoned leaves become poisoned themselves and die. Banding the trees in early spring with burlap or cotton batting is useful in so far as these bands serve as traps enabling the owner or caretaker to come along and collect the caterpillars under the bands where they have a tendency to gather in masses. The band, however, is not an absolute impediment.

The bag-worm is also sometimes called the basket worm, and produces small caterpillars hidden in bag-like shelters composed of particles of bark, leaves, etc. The insect spends the winter in the egg state. It emerges in form of a young caterpillar in May or early June and feeds on the leaves of trees in the summer. It is most injurious to certain evergreens, especially arbor vitæ, but does damage also to maple, oak, elm, poplar and other species of trees. The remedy consists in (1) collecting and burning the bags all winter, and (2) spraying for the caterpillar in the summer with arsenate of lead, one pound to ten gallons of water.

Q. Will you advise me when it will be best to transplant a copper beech about seven feet in height and what method should be employed.

E. K., *Hackensack, New Jersey.*

A. The best time to transplant your copper beech is in April. Dig the tree and carefully preserve a ball of soil around its roots. Wrap the ball around with burlap to prevent it from breaking in the process of transplanting. Beech are difficult to transplant and the ball of soil is quite necessary. Beech trees can also be moved in the winter time with a frozen ball of soil but early spring is preferable. It is also advisable to trim back lightly the branches at the time of transplanting.

Q. Where can I find information on the proper treatment of natural lakes in city parks? The St. Paul and Minneapolis Park Boards invariably dredge the shores and conventionalize them by a fringe of willows. To me this process takes a large part of beauty and interest away from them.

D. L., *St. Paul, Minnesota.*

A. You can find information on the treatment of natural lakes in city parks in "The Art of Landscape Architecture," by Samuel Parsons in Chapter 8. There is very little else written on the subject. The matter of treatment depends to a very great extent on the purpose and use of the lake, and the individual taste of the designer.

Q. We have a proposition to plant up a swamp near Madison, Wisconsin, with some quick growing trees. They are going to drain it eventually, but before they do they want to make it attractive by planting clusters of quick growing trees and shrubs, probably using several thousand. What kind would you advise planting in that locality?

W. W. M., *Chicago, Illinois.*

A. I believe that you would do best to use the willows, the *Salix alba*, or white willow, being a splendid, quick growing variety. Any of the willows or the dwarf willows would answer

your purpose very well. If the ground is not too wet, that is, so that the trees would be under water, you might also be successful with the pin oak and the scarlet maple, both beautiful trees. As to shrubbery, you could use alder, milky dogwood, elder and the various viburnums with success.

Because of the location of the area in Wisconsin, I would suggest that you consult a local nurseryman, or at least one familiar with that section, as to the best varieties of the species I have mentioned for use there. He would, of course, be able to tell you just which ones would be hardiest under the climatic conditions there. It is always best to have the advice of some local man in the business if it is possible to secure it, before going into any extensive planting. But you may safely follow the above general suggestions in making your plans.

Q. I have a little earth plot, but the earth is full of worms which eat the roots of all the plants in my garden. What can I do to kill the worms?

E. W. K., *New York City.*

A. You can bring all the worms to the surface of the ground by pouring a liquid known as "worm eradicator" over the surface of the ground, and if the trouble is caused by rodents you can dip some wheat in strychnine and dig it into the soil around your plants.

Q. Is the ailanthus a good tree to plant? If not, why not?

J. M., *Rome, New York.*

A. The ailanthus has one great advantage over most other trees in being able to adapt itself to the poorest conditions for tree growth where few other species will grow. It is also a well balanced tree and is therefore of great value in planting under certain poor conditions where little else will grow. On the other hand, for general planting, the ailanthus is not to be encouraged in preference to other species. The ailanthus grows quickly and dies quickly. It is shallow-rooted and liable to overturn in windstorm. Its wood is soft and brittle and when the tree reaches the age of thirty or over, it becomes hollow and dangerous.

Q. My tree, I think, has been killed by gas. How can I detect it and how can I recover damages? The tree is in front of my house on the city street.

Mrs. F. McN., *New York City.*

A. Dig around the tree and try to detect the odor of gas. Apply to your city forester and ask him to help you.

Q. Please tell me the best kind of trees to plant for shade in an outer yard where quick returns are wanted. The lot is protected from the wind by a hill. No clay subsoil.

J. H. W., *Cedar Springs, Virginia.*

A. Replying to your inquiry, I do not think you could get any tree more satisfactory for your purpose than the red oak. This is a beautiful shade tree and one of the most rapid growing. It is hardy and healthy also. Another good tree for open planting in a yard for quick shade is the tulip tree, a rapidly growing tree with beautiful flowers and foliage, and splendid for shade. The Carolina poplar is also good, but the other two species are much to be preferred. I enclose our bulletin on the Selection of Shade Trees, which will give you valuable information.

Q. In treatment for hollow trees you recommend a wash made of copper sulphate. Is this the chemical or commercial form of copper sulphate? Where do you obtain it, and how much should it cost? The ordinary druggist does not know what to supply, and therefore recommends something quite different.

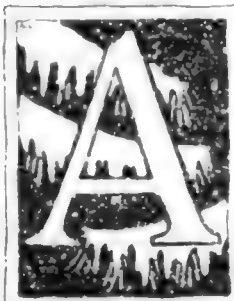
R. B. J., *New York City.*

A. The copper sulphate may be secured in commercial form. Get "Bordeaux mixture," which comes prepared and can be obtained at any large seed store. If you have a copy of Levison's "Studies of Trees," read the chapter on cavity treatment. It is full of good information. If you haven't the book and wish it, we can secure it for you. The price is \$1.75.

FORESTRY FOR BOYS AND GIRLS

BY BRISTOW ADAMS

Common Sense and Christmas Trees



VERY nice, kind lady wrote me a letter the other day and asked me to do all I could to put a stop to the slaughter of the poor, little, innocent Christmas trees. I showed the letter to the children and they did not feel that

way about it. The writer proposed a number of things to take the place of the tree, but not one of the ideas seemed to find favor. We talked it all over very thoroughly, and then put the question to a vote,—as to whether we would have a tree this year. At the mere prospect of not having one, the two boys were very downcast.

The nearest that we came to falling in with the ideas of the writer of the letter was when Eleanor, the oldest, said that she really did not need a tree, "but it wouldn't be half so Christmas-y without one." Then she added, from the great wisdom of her thirteen years, "The boys are so young yet that they ought to have a little one, at least." The boys did not care to be patronized, and taunted their older sister with the tale of how she had been the one who wanted to cut down three or four trees last year, when we went out to the woodlot.

We did cut three, as I remember. We wanted a spruce or balsam, but were saving the spruces to grow into larger trees, and we could find no balsams. So we got a fairly stocky hemlock. When we got home we bored holes through the stem from all sides, and stuck in branches from the other trees, driving a nail through to hold each branch so it would not twist sideways, or turn down. The extra branches were used for wreaths and for spots of green around the rooms.

When Christmas week was over, we took pruning shears and saw, and cut the tree into fagots right where it stood in the room. Then we burned these, with

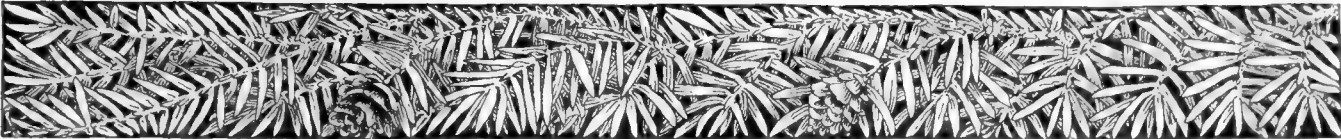
merry cracklings, in the open fireplace; it gave us a woodsy, camp-fire smell, and we sat around and told stories until every little "smidgeon" was burned up. Of course, we first took off all the tinsel and toys, all the blown-glass and spun-glass figures, the gilded balls and the gay paper chains. These were put away in the Christmas Box, to be brought out again, with some new ones, for the next time.

EVERY year some one starts a crusade against the Christmas tree idea, and every year I wonder why they do not do the same thing against the Easter lily and the football-game chrysanthemum. In Michigan there is a nursery which grows Christmas trees as a regular annual crop; in New England the farmers cut hundreds of thousands out of their fields for the city boys and girls, some of whom rarely get in any closer touch with trees than they do in this holiday season. Every year the dairy farmers in the hill counties of New York welcome the chance to get rid of the spruces which work into their pastures and use up space that might be growing grass for the cows. The more our family has thought about the use of Christmas trees, the more we have been in favor of them.

ONE person says, "let's all do without Christmas trees; or, if we must have them, let every one plant two trees for the one that is used on Christmas." Now that might be a good idea in some few places. But how about the many children who live in tenements in the crowded parts of the cities? Are they to go without this one glimpse of greenness, or attempt to make two trees grow in a paved court-yard? Even in the large and elegant apartment houses the mighty janitor could not provide places for two trees for the children who live there. Oh, yes, there are some apartment houses that take children. I've seen 'em!

Then there are the children on the farm, where father has brought in the home tree from the back pasture, and has sent John down to the freight station,





with forty bundles of trees on the big sleds. He is glad to have that much more clearing done, and to have the work pay for itself. He wouldn't care, I am sure, to have a tree-planting band go out and put in two new ones.

Besides, there is all the trouble and expense of getting the two additional trees, and the very great risk that they will not live after they are planted would make possible a loss of three trees instead of one.

THE best way is to have just as much or as little Christmas tree as you wish, but not to try to make other folks do things your way. In many cases the merriness of the Christmas of the farm child depends on whether there is a good sale for the trees that the farmer hauls to train or town. In any case, could we get the opinion of the tree, it would probably echo what Gertrude said in our discussion: "If I were a tree I'd rather be used in making little children happy at Christmas than in any other way."

HERE are some of the Christmas tree ideas that we have tried, or that we have known other persons to try:

In addition to our own tree indoors we have had another just outside of the living-room windows for the birds. This we string with popcorn and cranberries, and fasten pieces of suet to limbs and trunk. Where we are now, we find that the chickadees and nuthatches are our most frequent visitors; but when we were farther south the tree was gay with the plumage of jays and cardinals. The cardinals were very fond of sunflower seeds; the jays ate all of everything and were a good deal of a nuisance, because they tended to drive the other birds away. We think they are the pigs of the bird tribe.



THEN I have known of city children who played "woodyard" after Christmas, taking the trees from their own homes, and those from vacant lots and ash piles, where they were poor forlorn skeletons of their former selves. All these were cut into short stove lengths, and bundled together, and were then carted around to poorer folks, on bright, new, red, Christmas sleds and 'spress wagons.

ON one of the many festive occasions that they have in the city of Washington, such as "Inaugurations" and the like, a great court was trimmed with upright red cedars, or Virginia junipers. After the great day was over the wreckers were going to cart away and destroy these trees. In the meantime, however, the teachers at the new Normal School got the idea that they could make a pergola of the tall trunks, and gained permission to use them. Part of the projecting branches were left on, so that climbing roses could easily twine around and hold on. This arbor was built not so many years ago; now it is one of the beautiful sights of Washington in summer, and pleasing even in winter.

IN Oakland, California, a man has invented a combined hat-rack, clothes-dryer, and Christmas tree. Folks are always doing such things in that original State. Where there is so much outdoors, they combine all sorts of things to save space. It's nothing at all to go to bed in what had appeared to be the side-board, to find that the book-case is really a refrigerator, the library table a gas stove, or the jardiniere a talking machine in disguise. So the Oakland man's patent provides for a central tube with holes in it, in which green branches may be thrust. His claim is that it can use boughs trimmed from standing trees and still leave them growing.



USE OF BLIGHT-KILLED CHESTNUT

BLIGHTED chestnut timber resists decay as well as timber from healthy trees, and barked dead wood is much more durable than unpeeled live wood, so far as a three-year test will determine, according to the Forest Service. The blight is otherwise known as the chestnut tree bark disease. In 1913, poles, ties, and posts cut from blight-killed, blight-infected, and healthy chest-



BLIGHT-KILLED CHESTNUT USED

Except for the knot-hole around which decay has set in, this chestnut post from a tree killed by the blight is sound after three years' use.

nut trees were carefully tagged and placed in position. A recent annual inspection of the experiments determined that all of the material was in good condition except for deterioration of sapwood and knots. The sapwood of chestnut is not durable and that on ties and on butts of poles and posts and on unbarked posts is now mostly decayed. Round posts cut from small limby trees suffer early decay in the knots which carry the decay into the post and thus weaken it.

The chestnut durability experiments to date indicate that blight-killed or infected trees yield timber just as durable as that from healthy trees. In fact, a piece from a seasoned dead tree is more durable than an unbarked piece from a live tree. No one should therefore hesitate to use timber from blight-killed or infected trees for purposes for which chestnut is suitable and durability is a consideration.

A PETRIFIED STUMP

THIS is a petrified hollow stump about five feet in diameter and forty inches high and weighs over seven thousand pounds. It was found by F. W. Pettigrew in a ravine on the west side of the Little Mis-



A WONDERFUL PETRIFIED STUMP

souri River near the northwest corner of the State of South Dakota. The stump is now in the front yard of the residence of Ex-Senator R. F. Pettigrew at Sioux Falls, South Dakota, having been presented to him by his brother.

The stump may be several thousands of years old. It is solid stone, but has the appearance of having been a cottonwood tree. When found, it was full of dirt and half covered by dirt on the outside and was partly exposed to view by erosion. Ex-Senator Pettigrew, who has for many years taken a deep interest in everything pertaining to forestry, had the stump taken from the place where it was found to his home at Sioux Falls.

LIGHTNING shows a marked preference for chestnut trees, according to data based on reports submitted to the Department of Forestry by its foresters. Of a total of about 2,000 trees struck by lightning on the State Forests in the past four years, 655 were chestnut. Pitch pine comes next with 327 trees struck, and then follow in order rock oak, white pine, hemlock, red oak, white oak, black oak, locust, and sugar maple. Black birch is at the foot of the list with only one tree struck in four years. Poplar and walnut come next, only two of each being struck.

Great Forestry Conference and Annual Meeting

SO serious is the danger threatening the white pine trees of this country at the present moment and so certain is it that other tree diseases will be brought into this country unless prompt preventive measures are taken, that the American Forestry Association has called a country-wide forestry conference in conjunction with its thirty-seventh annual meeting.

This conference and meeting will be held at the New Willard, Washington, D. C., on Thursday and Friday, January 18 and 19, 1917.

The meetings will be devoted to four big subjects, each one of national importance. These are:

The Pine Blister Canker Threatening the White Pines of the United States and Canada, and what shall be done in the effort to stamp out the disease where it has appeared, and prevent its spreading into sections where it is certain to go unless proper precautions are taken. This subject will comprise state and national legislation to provide funds for fighting the disease and national and state quarantines to prevent its spreading. The subject will be discussed by the leading experts of the country.

A Federal Quarantine Against Importation of Tree Stock.—Practically all the pests and diseases which have affected, damaged and destroyed trees in North America have been imported from other countries. These diseases and pests are still invading this continent. Some have recently been discovered, others are doubtless developing. Millions of dollars of damage has been done. At the forestry conference will be discussed the advisability of a wholesale quarantine against the importation into North America of tree stock from any other country.

Recreational Uses of National Forests and National Parks.—This is a subject of which the public knows far too little and it will be the aim of the forestry conference to present to those attending, and to the public in general, facts relating to the use of the National Forests by the public for recreation and to improvements in the public service in the National Parks.

Government Aid in Obtaining Economic Justice for Lumber and Forests.—There have within the past year been developments in government co-operation with forest owners and people interested in forest products about which the public knows far too little. What has been done, and what this will lead to will be presented to the forestry conference and will prove of widespread interest.

To this meeting and conference will come not only members of the association but also special delegations appointed by governors of all the states and by the Provincial Governments of Canada, representatives of the forestry and agricultural departments of all the states

in the white pine area; of nurserymen's organizations; forest and plant pathologists, city foresters, shade tree commission members, and of all associations interested in trees and forests.

It is expected to be the largest and most important forestry conference ever held in North America.

The Program

The program will be on the following plan:

Thursday, January 18—Morning.

Annual meeting of the American Forestry Association.

Annual address of President Charles Lathrop Pack.

Annual reports of the Secretary.

Address: "Economic Justice for Lumber and Forest."

Election of officers.

Thursday, January 18—Afternoon.

Forestry Conference

Address: "Recreational Uses of the National Forests."

Address: "National Parks as National Playgrounds."

Address: "Forests and Parks as Game Preserves."

Address: "Recreational Problems in the East."

Address: "Recreational Problems in the West."

Friday, January 19—Morning.

Address: "What is the Pine Blister Canker Disease?"

Address: "The Present Situation—

In New England,

Hudson to Mississippi River,

Pacific Coast,

Canada."

Address: "What Can We Do to Fight the Disease?"

Address: "Shall We Plant White Pine?"

Address: "The Problem as a Whole."

Friday, January 19—Afternoon.

Address: "Losses Caused by Imported Tree Pests."

Address: "Domestic Cultivation of Trees Now Imported."

Address: "The Necessity for a Federal Quarantine Against Tree Importations."

There will be full discussions of each of the subjects on the program on the floor of the forest conference.

Members of the Association who expect to attend, and others, not members, who are interested and would like to be present, are requested to notify the Secretary, American Forestry Association, Washington, D. C. Full details will be sent upon request.

The Pine Blister Disease

National and State Legislation and Vigorous Public Action Demanded in the Effort to Retard the Spread of the Deadly Canker which Threatens the Death of the White and Five-Leaved Pines

STEADY progress in the spread of the white pine blister canker or disease, as it is now generally known, is reported from New England, while several new sections where the infection is apparent have recently been discovered. The situation is becoming more and more serious, and it is now apparent that if the extremely valuable white and five-leaved pines of this country and Canada can possibly be saved, no time must be lost in conducting a campaign against the disease.

Experts agree that there should be national and state quarantines to prevent the shipment of white pine, and the currants and gooseberries from which the disease spreads to the pines. A state quarantine is necessary so that the disease shall not be carried by shipments from one state to another, or even from one infected section of a state to another region in the same state, while a Federal quarantine is needed so that a dead line may be established west of the Mississippi River in all the Great Plains states, in the effort to prevent the disease spreading to the very valuable sugar pine of the Pacific Coast.

State and national appropriations will be needed to carry on the work of scouting to discover infected pines, currants and gooseberries; for investigative work in studying the disease and for eradicating it wherever there is an outbreak. This work of eradication will consist of cutting out wild and cultivated currants and gooseberries when infected or when they are considered likely, owing to their proximity to an infected area, to become diseased and thus to aid in spreading the canker to pines near them. This kind of work is hard, slow and laborious, and the expense of it is considerable. It is, however, the only way by which the rapid spread of the disease may be retarded.

There will soon be submitted to Congress a bill providing for an appropriation, doubtless for \$1,000,000, for Federal cooperation with the states of the white pine belt in

fighting the blister disease, and bills will be introduced in the state legislatures to secure stringent quarantine measures, and to provide money for investigation and eradication work. A model law, covering the situation in the most effective manner, is now being prepared by a committee of experts, and will soon be available. At the same time four experts from all the states in the white pine belt, together with four from each of the infected provinces of Canada, constitute a general committee, the aim of which is a vigorous campaign against the disease.

The American Forestry Association will work in cooperation with this committee, will give widespread publicity to the fact that the disease exists, what it has already done, and what means should be taken to combat it, and will also do all in its power to aid in obtaining the desired state and national legislation, and in endeavoring to secure the quarantine regulations which shall be best

suited for the situation as it exists in various states.

At a meeting of representatives of the American Forestry Association and of members of the Committee for the Suppression of the Blister Disease, at Albany, New York, on November 20 and 21, and again in New York City on December 4, plans for the warfare against the blister disease were discussed and adopted, and at the forestry conference at Washington, D. C., on January 18 and 19, under the auspices of the American Forestry Association, the sub-committees from each state, members of delegations appointed by state governors and by the Dominion of Canada, officials and members of the American Forestry Association, will report the progress of the campaign and take up for general discussion and action the most important details regarding it.

The aid of every public spirited citizen is needed to make this work successful. The chestnut blight, to which but little attention was paid when it first appeared, was beyond control when full

CALL TO A FOREST CONFERENCE

CHARLES LATHROP PACK, President of the American Forestry Association, has issued the following statement:

"Expert investigation establishes the fact that the white pine and other five-leaved pines of the United States and Canada are threatened with extinction by the white pine blister canker, a fungus disease imported from Europe. Already the disease has been found in all the New England States, most of the eastern and northern states in the white pine belt and in Ontario and Quebec provinces. It is spreading steadily and unless checked will wipe out our white pines, valued at \$260,000,000, as our chestnuts are being wiped out by the chestnut blight.

"The area east of the Hudson River is generally infected. Whether the disease can be controlled in that area or not depends upon whether currant and gooseberry bushes on which the disease propagates and spreads to the pines can be eradicated.

"Between the Mississippi and the Hudson Rivers we have an area infected with scattering infections, but throughout which the disease may be controlled and perhaps suppressed by the enforcement of rigid quarantine laws and every possible and proper precaution. West of the Mississippi is an area which as far as is known is not yet infected but which may be infected unless state quarantine laws keep out of it white pine seedlings and currant and gooseberry stock which may be diseased.

"In view of the imminent danger of the destruction of the white pines, the American Forestry Association will call upon the governors of all states in the white pine belt and the government of Canada to send delegations to Washington, D. C., to attend an international forest conference to discuss measures and formulate plans for fighting the disease, suppressing it, if possible, and saving the white pines of the present and of the future. This conference will take place on Thursday and Friday, January 18 and 19, on the occasion of the Thirty-seventh Annual Meeting of the American Forestry Association."

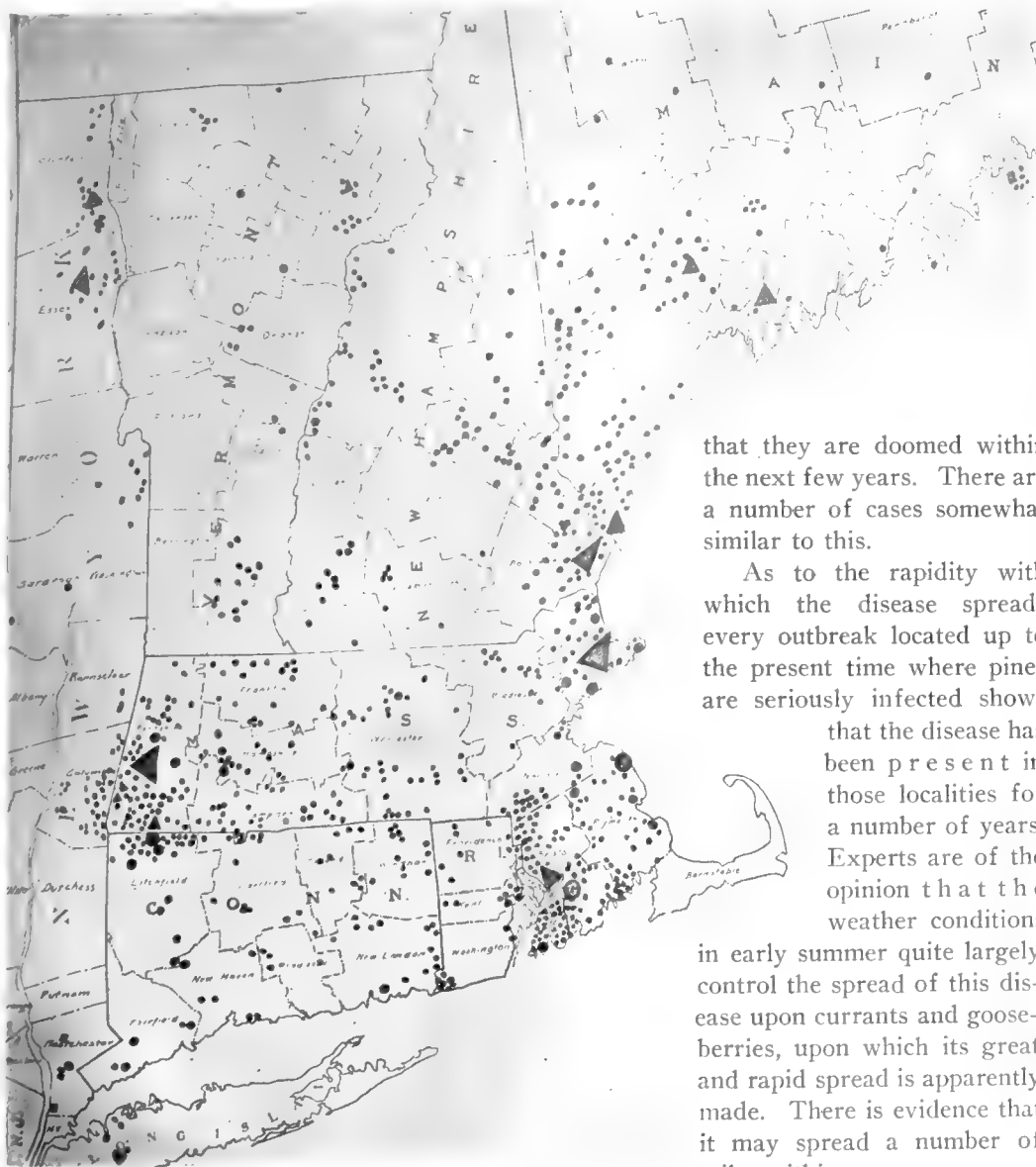
realization of its danger came, and now the chestnuts are practically wiped out. It is not intended to permit the pine blister disease to get beyond control if it can be helped, and that is the reason why the American Forestry Association and others interested are determined to institute a vigorous and aggressive fight against it with the least possible delay.

Many questions regarding the blister canker are asked, and the most important among them may well be answered in the following paragraphs:

The disease is now located in practically all of New England, in areas of a number of square miles each in New York at Essex, along the lower New York-Vermont border, and the New York-Massachusetts border, and at Tarrytown. There is an area of a number of square miles located on the Minnesota-Wisconsin border, east of St. Paul and extending roughly from the vicinity of Hudson, Wisconsin to Taylors Falls, Minnesota.

These are known outbreaks of the disease. The disease has been located in two or three nurseries in New Jersey and Pennsylvania, but so far as is now known there is no outbreak of the disease within these States.

As to the damage already done by the disease, it is very difficult to state because up to this year most of the outbreaks of the disease have been wholly or largely eradicated as soon as found, so that the disease has been immediately stopped at the time of finding it. This year, however, a considerable number of serious outbreaks, previously unknown, have been discovered. The one which probably will give a better idea of what this disease means to this country than any other is located in southwestern Maine. Here accurate counts have shown on quarter acre plots that 85 per cent of the total stand was diseased. Of the infected trees about 50 per cent were already dead or were girdled on the trunk so



WHITE PINE BLISTER DISEASE IN NEW ENGLAND

The pyramids indicate outbreaks of the infection on native white pine. The squares indicate where infected white pine, currants and gooseberries have been found in nurseries. The dots indicate areas of infected pines, currants and gooseberries.

that they are doomed within the next few years. There are a number of cases somewhat similar to this.

As to the rapidity with which the disease spreads every outbreak located up to the present time where pines are seriously infected shows that the disease has been present in those localities for a number of years. Experts are of the opinion that the weather conditions in early summer quite largely control the spread of this disease upon currants and gooseberries, upon which its great and rapid spread is apparently made. There is evidence that it may spread a number of miles within a year.

The advisability of cutting the affected tree at once or of cutting off affected branches is



INFECTED WHITE PINE

The blister is here seen in a fruiting condition with myriads of spores to infect the foliage of currants and gooseberries.

much discussed. Experts

advise neither course until some state or Government official has had a chance to examine the locality and make recommendations according to the circumstances.

Questions regarding the efficiency of spraying diseased trees are often asked. Spraying is inefficient and is not

recommended under any circumstances as a means of control of disease. Spraying of currants and gooseberries might be resorted to in exceptional cases for the purpose of holding the disease in check until further action which may be pending can be decided.

The National Forest Enterprises*

BY HONORABLE DAVID HOUSTON

Secretary of Agriculture

THE value of the national forests to the public and the use made of them increased steadily. Their returns to the Treasury last year, exceeding \$2,800,000—an advance of more than \$340,000 over the previous year—are only a partial indication of their service. An augmented volume of business, due to a larger number of timber purchasers, and a net addition of nearly three-fourths of a million to the number of stock grazed, together with a decided stimulus in prospecting and mining activities and in the use of the forests for recreation and health, are further indications of broadening development.

Through successful administration the permanence of the national forests is becoming more and more assured. They are now a vital part of the economic life of the regions which use their resources. It is increasingly clear that national supervision and control of them is necessary and that they could not be abandoned without disastrous consequences to western industries and to local welfare.

ROAD DEVELOPMENT IN FORESTS

The need for more ample provision for road development in the national forests was emphasized in my reports of the last two years. At the last session of Congress this urgent need received recognition through the enactment of the Federal Aid Road Act. This legislation constitutes one of the most important and far-reaching steps in national forest development which has been taken for a long time.

EASTERN FORESTS

By making provision for the continued purchase of forest lands in the East, Congress once more has recognized the permanence of the national forest policy. Three million dollars, expendable during the fiscal years 1917 and 1918, has been made available for this work. The purchase of lands in the Appalachians and White Mountains, with a view primarily to the control of stream flow affecting the navigability of rivers, began in 1911. Under the provisions of the Weeks Forestry Act there have been approved for purchase 1,396,367 acres, at an average cost of \$5.22 per acre. The lands are in excellent condition and have been secured at very reasonable prices. These newly established forests already are rendering important public service and are being used extensively. There is a marked demand for the timber upon them. The timber

is cut in accordance with sound forestry practice. The White Mountain forest in a short time should return to the Government as much as it costs to protect and administer it.

UNWISE LEGISLATION

Millions of dollars, appropriated by Congress for the improvement, development and consolidation of the forest holdings, have gone into the properties. Only on the assumption that the forests are to be permanent would expenditures of this character be justifiable. Abandonment of the work after it has been carried to its present point would be a stultifying course. Nevertheless, repeated efforts in this direction still are made. Measures of various kinds, which, if adopted, seriously would injure or even render ineffective the whole national-forest enterprise, are urged. The proposal that the properties be turned over in their entirety to the several states has a waning support and no longer needs to be taken seriously. On the other hand, efforts frequently are made to secure the abolition of individual forests. Proposals to do away with the forests in Alaska still find strong advocates. As pointed out in my last report, such action would be unwise and unfortunate. Action of this sort, however, can be met squarely on its merits, for the question of abolishing a national forest raises a clear-cut issue which the public cannot misunderstand.

A more serious danger to the national-forest system lies in the repeated efforts to open them to the action of some general land grant or to the laws applicable to the unreserved public domain. Each year there are introduced in Congress numerous proposals designed to open the forests, or portions of them, to private acquisition or to disposition of one kind or another. One measure of this character passed both Houses of Congress during the last session and failed to become law only through the presidential veto. It proposed to open the forests to the acquisition of lands by any incorporated city or town for park and cemetery purposes and to counties for park purposes. Every public purpose of the proposed measure can be realized under existing law. So serious would be the effect of such a measure that, if enacted, undoubtedly it would be necessary within a few years actually to abandon a number of important forests. In his veto message, after explaining that the measure was entirely unnecessary and would have unfortunate public consequences, the President said:

* From the annual report of the Secretary of Agriculture to Congress.

"But the most serious objection to the bill is that it subjects the national forests to disposition under a general grant. At the very time while provision is being made for purchase by the Government of forested lands in the East for the protection of watersheds it is proposed to permit similar lands in the West to be permanently alienated. I would respectfully urge that it is unwise to permit alienation of the national forests under general legislation of this sort. If the process of piecemeal distribution is begun, independently of any oversight or control of the National Government, there is manifest danger that the forests will be so disintegrated as to make their efficient administration impossible and the purposes for which they were established unattainable. Against such a process the national forests should be carefully protected."

The use of the national forests for recreation purposes continues to extend. Thousands of local recreation centres, public picnic and camping grounds, excursion points, and amusement resorts are being developed. Some of the areas, located near enough to cities and towns to be reached by considerable numbers of persons, serve already the purposes of municipal recreation grounds and public parks. To meet local needs along this line, the department is coöperating with municipalities. These forms of public service can be rendered without difficulty in connection with the fulfilment of the general purposes of the forests.

NATIONAL FORESTS AND NATIONAL PARKS

The handling of the national forest recreation resources inevitably raises the question of the relation of the national forests and the national parks. At present there is no clear distinction in the public mind between the two. Both are administered for the benefit of the public along lines which overlap. The parks and forests occur side by side and have the same general characteristics—extensive areas of wild and rugged lands, for the most part timbered, with development conditioned upon road construction and similar provisions for public use. They differ chiefly in the fact that the attractions of the national parks from the recreational standpoint are more notable. Yet this is not always true. Several of the parks are inferior in their natural features to portions of the forests. The need of drawing a clear distinction between national parks and national forests and of a definite policy governing their relation is increasingly evident. Parks are being advocated where the land should stay in the forests, while elsewhere areas which should be made parks continue to be administered as forests—for example, the Grand Canyon of the Colorado.

A national park should be created only where there are scenic features of such outstanding importance for beauty or as natural marvels that they merit national recognition and protection and, on this account, have a public value transcending that of any material resources on the same land—such areas, for example, as those now comprised in the Yellowstone and Yosemite Parks and in the Grand Canyon National Monument. The areas should be large enough to justify administration separate

from the forests and the boundaries drawn so as not to include timber, grazing, or other resources the economic use of which is essential to the upbuilding and industrial welfare of the country. In addition, when parks are created from parts of the forests, the portions remaining as forests should not be left in a form difficult or impossible to administer.

CLEAR-CUT POLICY NECESSARY

The importance of a clear-cut policy is evidenced by the efforts frequently made to secure the creation of national parks out of areas containing great bodies of timber, extensive grazing lands, and other resources, the withdrawal of which from use would be uneconomic and prejudicial to the local and general public interest. In most cases the desire for a specific park, where economic use of the resources also is essential, has led to the proposal for an administration of the area, after the creation of the park, identical with the present forest administration. Several such measures now are before Congress. Their enactment would result in a mere division of the public properties into parks and forests, having no distinction except in name; handled alike but by duplicate organizations in different departments. Still more serious is the fact that the cutting up of the forests would greatly cripple administration of the remaining lands. It would doubtless mean the abandonment of large areas which should remain under public ownership and control for timber production and watershed protection. It would greatly reduce efficiency in forest fire protection and in the handling of current business, increase the expense of protection and administration, and cause endless confusion to users, who in many cases would have to deal with two departments in developing resources when, for instance, logging and grazing units overlap.

The protection of the scenic features and the development of the recreational use of the lands are being taken care of in the national forests. Some of the most unusual scenic areas in the forests are best suited to a full park administration. The bulk of the forest areas, however, should continue in their present status, where they will be fully protected and developed for recreation purposes as a part of the forest administration. The extensive road building, made possible by the \$10,000,000 recently appropriated, will open them up rapidly.

An added cause of confusion is the fact that national parks and national forests are administered by two executive departments. While there is an effort to coöperate, nevertheless difficulties arise which could be wholly avoided if they were under one department. Unquestionably the administration of the forests should remain in the Department of Agriculture, because of the close relationship of the work of the Forest Service to the activities of other bureaus of the same department, such as the Bureau of Plant Industry, Bureau of Animal Industry, Office of Public Roads and Rural Engineering, Bureau of Soils, Bureau of Biological Survey, and the Bureau of Entomology. Obviously, there are in the

forests many problems relating to live stock, plant growth, predatory animal and insect control, soil conditions, and road and trail work. These great bureaus are directly and intimately concerned with these problems. If the forests were transferred to another department, that department either would have to duplicate these bureaus in part, or would have all the difficulties of coöperation with another department which seem to be inherent. Whether the National Park Service should be transferred to the Department of Agriculture is a matter for consideration. If the transfer should be made, it would be unnecessary and,

in my judgment, unwise to consolidate the work of the two services. The park service should take its place in the organization of the department as an independent bureau, with its activities closely related to those of the Forest Service. Certainly, if the two services are to be administered by different departments there should be the closest coöperation throughout. Such coöperation should include not only the question of the creation of new parks out of national forests, but also fire protection on contiguous properties, game preservation, road building, and other activities.

Editorial

FORESTS AND CLIMATE

FORESTRY in one form or another appeals to every human being. Although we no longer seek the leafy fastnesses, climbing with all fours to escape some prehistoric form of beasts, yet, even in the dawn of history the forest supplied us with game and fuel. The wooden house became the home in place of the cave, and the heart of the home was the hearth. Uses multiplied as standards were lifted. Furniture became a necessity, not a luxury. The inroads upon the forest became heavier. Finally, in many regions, through clearing, burning and intense utilization, the power of the forest was broken and it permanently disappeared. But the traditional reverence for the tree still survives, and we witness in this new land, in a single epoch, and side by side, the greatest and most rapid and beneficial exploitation and use of the forest ever before known, while those who receive these benefits in innumerable forms of which they are hardly conscious, protest instinctively and with all their might against the further spoliation of the woodland domain.

To give solidity to sentiment, which otherwise could make but little headway against necessity, the impressionist turns to the argument that forest destruction means the loss of rainfall, and with it, the decline of agriculture and the establishment of desert conditions in a once populous and flourishing community. These sentiments are then mistaken for the utterances of scientists rather than the theorizing of enthusiasts, and the result is a discrediting of foresters and forestry as based on false generalizations. For it is accepted that forests neither increase nor decrease rainfall as a whole. Deserts are not man-made—else how did the camel develop his form and adaptations. It took millions of years of desert conditions to bring about the structural changes in this animal, just as the neck of the giraffe became elongated for feeding on the tops of dwarf trees grown under similar semi-

desert conditions. Ellsworth Huntington has shown by the study of growth on the big trees in California that rainfall fluctuates by great cycles, centuries in extent, while the shorter vacillations from wet to dry and back to wet years, with a total swing of about twenty years, are familiar to all old inhabitants, and shown unmistakably by the records of our weather bureau.

It is not necessary to employ this questionable reasoning to bolster up the cause of forest preservation, for there are better arguments, and capable of proof, to justify the maintenance of true forest lands under tree growth. No reasoning can be found to justify a policy of denying to agriculture the use of fertile soils, or to the public the products of the forest, for fear of possible effects upon rainfall if the timber is removed. But upon true forest land, too steep to resist erosion, the forest cover has an enormous influence upon the behavior of this rainfall on reaching the earth. Science, which refuses to be convinced up to this point, has repeatedly shown by actual tests that streams flowing from wooded watersheds are clear, even in flow and continuous, while from denuded slopes similar in all respects, muddy torrents rush down after every rain, to dwindle soon to a mere trickle. These floods destroy the fertile bottoms, fill up reservoirs, and ruin navigation, while the irregular behavior of the streams greatly diminishes the value of water powers. On the headwaters of rivers rising in mountainous country, forests have the same effect as the dams by which the government seeks to regulate the flow of the upper Mississippi River, and in rough topography no dams will do the work of the forest. It is upon this sure foundation, and not upon fanciful, even if fascinating, speculations as to rainfall, that the great construction work of the National Government in the Appalachians and White Mountains is proceeding.

THE LESSON OF THE PINE BLISTER CANCKER

THE white pine blister canker continues to spread, and at the time this is written, the problem of its control has assumed gigantic proportions. So far, we have failed to check it. Why?

To answer that question is to lay bare some of the weaknesses of our easy-going methods and pioneer ideas of government. As a people, we learn chiefly by costly experience, and our memories are short. We do not yet

seem to realize that the average individual is apt to put his private gain ahead of public good, and that there are common interests which must inevitably suffer unless protected by efficient and capable public officials.

If we had no state or national officials to direct and organize the work, what private agencies would undertake to fight the blister canker and to overcome the hostility of interested nurserymen who refuse to sacrifice their business profits or the selfish obstinacy of land owners who will not permit diseased pines to be removed because they are still picturesque.

Previous to 1912 there was no means of preventing private importations of white pine from Europe. Yet, in 1909 the disease had been extensively advertised when trees shipped to New York from a German nursery were discovered to be so badly infested that on opening the packages the spores rose in clouds of yellow dust. Plantations of white pine made on state lands in New York from imported stock were promptly eradicated, root and branch, by the state foresters, in spite of healthy appearance and rapid growth. But importations continued during this three-year period, and some who should have known better shut their eyes to the risk and imperilled the safety of our most valuable timber trees because unwilling to face the possibility of a slight monetary loss at the start. We now know the result. In 1912 the Federal Horticultural Board, a new body designed to cope with problems of this character, prohibited further importations of white pine, thus placing a secure and thief-proof padlock on the barn door. Nearly four years afterwards, the nation has awakened to find that the horse is gone, and that the animal has travelled so far that his recovery is almost despaired of.

The disease works slowly and insidiously on pines, but once broken out into eruptions of reddish spores, which process may take two to six years, it jumps to the currant and gooseberry leaves and spreads rapidly before the wind.

We know now that nothing but the extermination of all imported white pines promptly upon the discovery of the disease would have effectually stopped this spread. But this summary action, taken by New York, was not duplicated by other states, by nurserymen, or individuals, nor was there any organized effort on the whole to follow up the private nurserymen, shippers of ornamental

stock, whose infected trees, in small lots, had been widely sold before the disease had become known. The National Government is without the power to destroy private property. The states were apathetic. The Federal Horticultural Board, appealed to in order to secure an interstate embargo on the shipments of pines and currants, did not feel justified in imposing this burden on private enterprise, but requested nurserymen to refrain from shipping currants or gooseberry bushes to the Rocky Mountain states.

This suggestion was indignantly scorned by the Middle West, which thought itself free from the disease and had been refused protection against the East. But in May of this year the blister canker was discovered in Wisconsin and Minnesota along the southern border of the great white pine areas of those states. Its source was traced directly to foreign stock sold by an Illinois nursery in 1908 to a firm at St. Croix Falls in Wisconsin, and from there purchased and introduced into two commercial nurseries in Minnesota on ornamental white pines. Eight years have already elapsed since the first diseased trees were set out in Wisconsin—it may now prove too late to stop the spread of the disease in these states.

The test of a civilization is its ability to meet new dangers, and to quickly adapt itself to unexpected situations. Confusion, hesitancy, differences of opinion, lack of initiative, opposition to energetic measures, and confession of failure before the fight is begun, are qualities that would endear us to possible enemies, for they show a total lack of ability to resist invasion.

What is the lesson? We must have men in public service who are trained to their duties, and then keep them there. We must be guided by expert opinion, and not too blatant in demanding our individual right to do as we please. Wherever effective public action is taken to combat this disease, the officials in charge of the work must be trained men, foresters or plant pathologists, with a practical as well as a scientific viewpoint.

Whatever is the outcome,—whether the white pine is to go the way of the chestnut or continue as our most valuable of all forest trees,—we must now adopt measures to prevent the importation of other tree enemies. We do not intend, if we can avoid it, to let our remaining forests burn up as of old, nor fall a prey to any other new and devastating imported bug or fungus enemy.

GREAT FRIEND OF FORESTRY DEAD

JOSHUA L. BAILY, an ardent and enthusiastic supporter of forest conservation, died in Philadelphia a few days ago, and the cause of forestry has lost a friend who did much to encourage it. Mr. Baily was for many years a vice-president of the American Forestry Association and seldom failed to attend a meeting, numbering as he did, his activities for the conservation of the

forests as one of his chief duties as a wide-awake and far-seeing citizen. One of Mr. Baily's recent acts for the cause was typical—he made forty of Philadelphia's public schools subscribing members of the Association, thereby providing thousands of school children and hundreds of teachers with information about the forests which will make them lovers and protectors of trees and woodlands.

What Readers Think

"We have certainly enjoyed to the fullest measure the wonderfully rich and varied departments of the truly beautiful AMERICAN FORESTRY. I regard it as especially interesting and inspiring to all naturalists, foresters and arboriculturists, and personally I wish to heartily thank the editorial staff for the very high standard of their work."

CHARLES S. MANN,
Haiboro, Pa.

"Glad to see you expand and interest a greater audience, for technical forestry alone cannot hope to hold a general public indefinitely."

FILIBERT ROTH,
Ann Arbor, Mich.

"Last Saturday I bought the February edition of the AMERICAN FORESTRY magazine quite by accident, but am so delighted with it that I am herewith sending a P. O. money order for \$3.00, for which please credit me with a Subscribing Membership in the American Forestry Association."

LYLE L. ALLEN,
Brooklyn, N. Y.

"I am glad to hear that The American Academy of Arborists has chosen AMERICAN FORESTRY as its official organ. Allow me to congratulate you upon the splendid magazine that you are now putting out. It is a great improvement over the earlier forms. It is certainly a good deal more attractive in appearance and the subject matter is equally more attractive."

CHARLES S. SCOTT,
Manhattan, Kan.

"AMERICAN FORESTRY is grand. In variety of subjects, method of presentation, and whole 'make up' it is on a high plane—almost ideal. You are certainly to be congratulated. If the present standard is maintained, the subscription list can scarcely fail to increase."

WILLIAM W. LAZENBY,
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"I surely am greatly interested in my magazine, and it is becoming wonderfully attractive and informing."

MRS. D. WILLARD,
Riverside, Cal.

"I wish to congratulate you most heartily on the continued attractiveness of the magazine. It is certainly a very effective publication and does the Association and yourself great credit."

W. B. GREELEY,
Washington, D. C.

"Perhaps half my time is spent on publications of one sort or another, and I wish to take this opportunity to say to you that you are making a wonderfully attractive and valuable magazine of AMERICAN FORESTRY, and I wish you all possible success."

JOSEPH W. TATUM,
Philadelphia, Pa.

"I am greatly pleased with the improved appearance and valuable contents of AMERICAN FORESTRY."

J. D. LACEY,
Chicago, Ill.

"The illustrations are exceptionally fine and the articles are such as would appeal to and interest all. The magazine fills a long-felt want in American literature."

W. D. LUDWIG,
Johnstown, Pa.

"The AMERICAN FORESTRY magazine has within the last year improved in leaps and bounds. The leading monthly articles on the identification and characteristics, the uses and products of our various trees, are very instructive, and prove beyond a doubt that forests are as necessary to the life of a nation as its foreign trade. For, after all, the finished or raw product has a direct relation to the forest—in fact, they are first cousins. I sincerely hope that the good work of the Association may continue, and that our present legislators may have the vista of America to-morrow."

E. WHEELER WHITMORE,
New York City.

"I have received AMERICAN FORESTRY, and am much pleased with it. It is well worth the subscription price."

A. K. MOODY,
Seattle, Wash.

The Pocono Association

The annual meeting of the Pocono Protective Fire Association of Monroe County, Pennsylvania, was held at Stroudsburg recently. Receipts amounting to \$1,416.69 and expenditures amounting to \$1,276.69 left a substantial balance in the hands of the Treasurer. This favorable condition was due, in some degree to the coöperative agreement existing between the State Department of Forestry and the Association, under Act of Assembly, by which the State returns to the Association one-half of the amount paid out by the Association for forest protective work. About six hundred dollars was returned by the State under this agreement. Fifty-six new members were elected during the year, the roll of membership amounting to 244. Forest fires, both spring and fall (to November 16), for the whole county, burned over only 582 acres, a marked contrast to the year 1915 when over 12,000 acres were burned over in the month of April. The general report of the directors enumerated a series of activities that plainly showed progress and prosperity for this private forest protective organization.

Tree-Planting Campaign

In connection with a tree-planting campaign recently instituted by the Rotary Club of Pottsville, Pennsylvania, an illustrated lecture entitled "Trees as a Municipal Asset" was given in the Auditorium of the Pottsville Y. M. C. A., by E. D. Kains, through whose efforts the Pennsylvania Shade-tree Act of 1907 was adopted in his home town, Wyomissing, near Reading, Pennsylvania, and who is a very earnest advocate of the principle of municipal control of shade-trees. The lecture has been given in a number of Pennsylvania towns and cities, and includes a very complete series of lantern slides showing the various activities of a municipal shade-tree department, such as proper methods of planting, tree butchery vs. scientific pruning, injury of trees by horses, tree surgery and the control of insect pests. The ten best species for street planting were illustrated by a series of beautifully colored slides, including some of the finest streets in America and Europe.

A Forest Enthusiast Dead

Forestry lost an enthusiastic supporter in the death on November 22 of Jacob Nolde of Reading, Pennsylvania, a life member of the American Forestry Association. Mr. Nolde did much for the forestry movement in Berks County, started two years ago and now so successfully conducted by the Berks County Conservation Association, while the forest planting on his own estate, under the charge of William G. Kohout, is one of the most extensive in the east and is a striking example of what can be done by intelligent reforestation.

Inspect Logging Operations

To give the students of Wyman's School of the Woods (Munising, Michigan) an opportunity to study the different logging operations as actually carried on in the north woods, the entire school went on a week's packing trip through the Upper Peninsula of Michigan and inspected some of the largest camps now in operation in that region and got many good "pointers," some of which can never be taught in the class-room.

Planting Shade Trees

"We have planted a number of ornamental shade trees on our country courthouse grounds with dynamite," writes C. N. Morton, County Commissioner, Sterling, Colorado. "The soil was heavy clay loam. The result of the action of the dynamite in loosening and shattering the soil to a great depth was very marked. The trees planted in these dynamited holes made a surprisingly greater growth than trees planted previously in spade dug holes.

Canadian Department

BY ELLWOOD WILSON

Secretary Canadian Society of Forest Engineers

Director of Forestry R. H. Campbell has just been visiting the Laurentide Company, Limited, plantations at Grand'mere. There are about 400 acres of plantations all the way from one year to four years old. These consist of Norway Spruce and Scotch Pine in mixture; Scotch Pine; White Pine, and Norway Pine in mixture; and Norway Spruce in pure stand. The Norway Spruce has also been planted in the open under the shelter of White Birch and Poplar, and also underplanted on land which has been logged over. The plantations are doing very well—the loss in Norway Spruce being less than one per cent, and all of the plantations are now beginning to show up in first class shape. A visit was also paid to a lumbering operation on land which had been heavily cut over for soft wood, the remaining stand consisting of large Hemlock and hard wood, mostly White and Yellow Birch, and Maple, and small Spruce, Balsam and Cedar. Practically all of the hardwood has been removed so as to give an opportunity for the soft wood reproduction to take place, and where this has failed, planting operations will be begun next Spring. Fire lines have been cut, and all the brush cut from them, and in cases operations have been burnt, and this has left the ground in good shape, and is a good example of what can be done along these lines. Mr. Campbell expressed himself as well pleased with the Laurentide Company's operations.

The Canadian Forestry Association has taken up with the governments of Manitoba, Saskatchewan, and New Brunswick, the question of introducing legislation looking to making "fire permits" compulsory throughout these provinces. The response met with has been favorable, and we hope that the legislation will be passed at the coming session. This will practically make a "Dominion-Wide Permit System" for protection against forest fires, and will be a long step toward the conservation of Canada's natural resources.

The following letter has been received from Mr. A. H. Unwin who is in the British Forestry Service in Nigeria, Africa. Mr. Unwin was formerly in the Dominion Forestry Service, and is a member of the Canadian Society of Forest Engineers. The letter is as follows: "In Nigeria I am in charge of the Working Plans Division, but since I came back this time I have been transferred to the British Sphere of the Cameroons (late German Colony) to report on the plantations and forests as well as the Agricultural resources. Needless to say the Southern Forests, such as I have seen of them, are grand with plenty of Mahogany of various kinds, besides Ebony,

rubber and bullet wood, also ironwood. Most of the land is really covered with forest, except for the small clearings of the natives here and there. The Germans had not developed the timber industry in this part very much; in fact, compared to Nigeria, they had been very slow in taking up Forestry and only had six men in all, compared to Nigeria's sixteen at the same date. They had, however, done a certain amount of planting at the District Stations, chiefly with Teak, rubber Cocoa, Indian blackwood, as well as what they called German Steamer. I cannot quite make out what they meant by this. They had planned to plant in the drier regions away from the Coast, but little had been done before the war. Now we will hope they will not be allowed to return. Several large rivers for floating logs are found both North and South, notably the Cross River and the Mungo, as well as four other rather smaller ones, the Akwayefe, Ndian, Moko and Meme. On the whole too it is quite a mountainous country, the Cameroon itself being 13,000 feet high, and then there are several ranges, such as the Rumpi, 4000 odd, on which there are good stands of timber. The chief difficulty in dealing with tracts is that there are so many different species on a given unit of area that it is almost impossible to make it pay with any great length of haul to a waterway. I have found as many as 73 species of trees in a valuation survey two chains wide and three miles long, and that is not a large number. The known species of timber trees regardless of shrub trees in this part is about 300, quite apart from the unnamed trees. It is like a vast arboreal collection, all mixed up without labels, and overgrown with creepers and undergrowth into the bargain."

The Dominion Royal Commission which was appointed in 1914 to look into the relations with Great Britain and her Colonies, and to examine into their natural resources, discontinued its sittings last year on account of the war, but has resumed them this year. These sittings have been held in the cities of the West and the Commission has just reached this part of Canada, where the meetings were held in Toronto, Montreal, and Quebec. At Toronto Dr. B. E. Fernow, Dean of the Faculty of Forestry at the University of Toronto, advocated federal jurisdiction over the licenses for cutting timber in Canada. At present, he said, each province regulated its own license system, and as a result there were wide differences between the laws of the various provinces. For instance, in Ontario a license could cut, without limit, whereas in Quebec the operations were subject to a number of important restrictions. Dr. Fernow commended the

work of the Forest Branch of the Department of the Interior in organizing fire protection on the Dominion Forest Reserves, and drew attention to the fact that Ontario had fallen far behind in its fire protection policy. Ontario was badly in need of a system of protection similar to that of British Columbia, which included lookout towers, telephones, trails and organized fire fighting forces. He said that Canada's total stand of timber was between 500,000,000,000 and 600,000,000,000 feet, and that the cut in any one year had never exceeded 5,000,000,000 feet, so that the supply might be considered inexhaustible or at least reproducible, by merely keeping fire out of the forests.

In Montreal forestry was spoken for by Mr. Ellwood Wilson of the Laurentide Company, Limited. Mr. Wilson rather startled the Commission by stating that if strict measures of conservation and reforestation were not adopted immediately on this continent within the next sixty-five years the pulp supply of Canada would practically have disappeared. It was also stated that three things were essential to the protection of the industry in this country; one was the adoption of a scientific scheme of reforestation; another a proper system of forest fire protection, such as had been adopted in British Columbia and on the land under the control of the Laurentide interests on the Ottawa and St. Maurice Rivers, and also a system that would do away with the dangerous disposal of waste that now prevails in the forests throughout Canada. It was also stated that during the past thirty-five years thirty per cent of the wood pulp of Canada has been burned over and rendered useless for generations to come. Since 1908 when fire protection was first introduced on a scientific basis the decrease in waste has been most marked.

In Quebec Mr. G. C. Piché, Forester to the Quebec Government, gave his testimony about Quebec conditions.

This Commission is composed of representatives from England, Ireland, Australia, New Zealand, Canada and South Africa, and is amassing a large amount of useful and interesting information which will be a great help to the British Empire in mobilizing their resources for a campaign for the increase of trade after the war.

For fire protection and prevention in Dominion Parks the Government has adopted portable fire engines which have remarkable capacity. Mr. J. B. Harkin, Commissioner of the Dominion Parks Branch of the Department of the Interior, Ottawa, in cooperation with Mr. J. C. Johnston of the Railway Commission Fire Branch, has adopted an engine which was completed last spring. Its weight, stripped, is 118 pounds, and, equipped, with solid oak base, etc., for work, 143 pounds. The engine is rated six horse power. It delivers twenty gallons of water a minute through 1500 feet of hose.



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Book Reviews

The Book of Forestry, by Frederick F. Moon, Professor of Forest Engineering, New York State College of Forestry, \$1.75. D. Appleton & Co.

A practical book on forestry which is up-to-date and intelligible to junior readers, and which is neither too technical for immature minds nor too popularly written for grown-ups. It is not a text book, nor an instructive manual, but rather a book of information on our original forests and the forestry movement in this country—its origin and present status. It will be of great assistance to boys who love the woods and wish to learn more about our trees and it will be especially helpful to Boy Scouts who are anxious to obtain merit badges on conservation, forest protection or fire prevention. Besides the chapters on the life of the forests and the activities of the lumber and log drive, there is one devoted to the general subject of conservation in which control of all natural resources, water, gas, oil and mineral, is advocated and the reason therefor given.

Our Field and Forest Trees, by Maud Going, \$1.50. A. C. McClurg & Co.

It is the story of the trees that Miss Going tells from the time that Nature plants the seed until the tree's maturity. Unlike most nature books which begin in the spring, this opens with the sowing of the seed in the autumn when the life of the tree really commences. The reader is then taken through all the stages of tree life and is told how the tree grows, how it lives, and what the leaves are for, etc., etc., together with a lot of wonderfully interesting tree and forest lore.

Current Literature

MONTHLY LIST FOR NOVEMBER, 1916

(Books and periodicals indexed in the library of the United States Forest Service.)

Forestry as a Whole

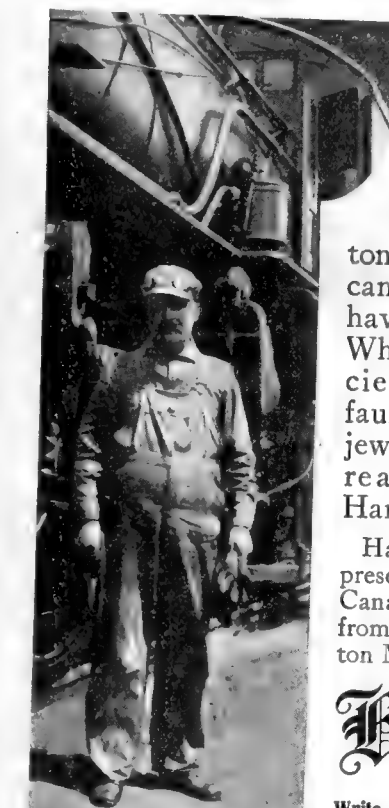
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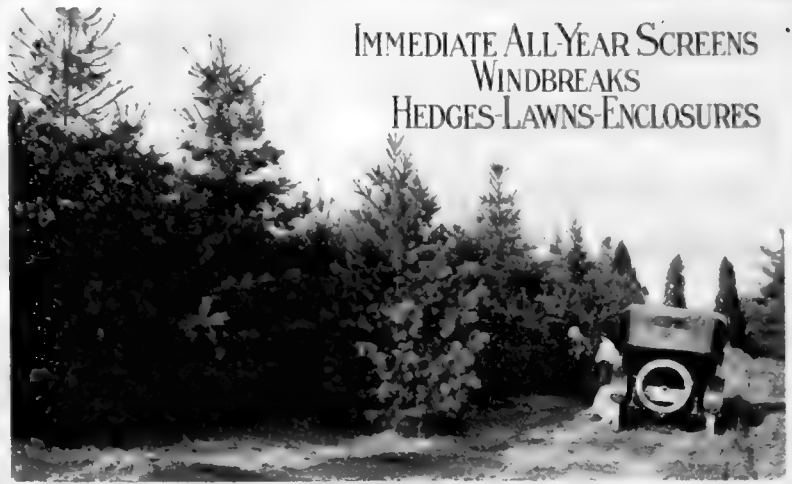
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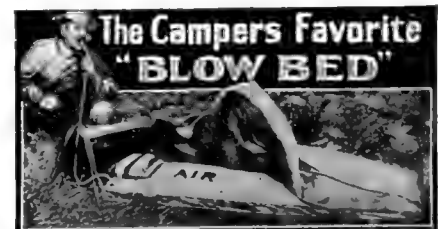
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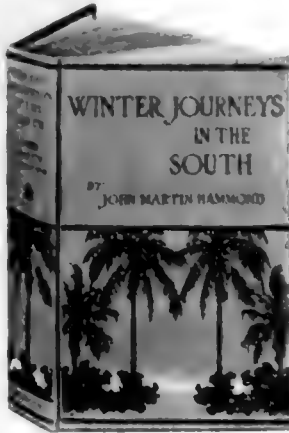
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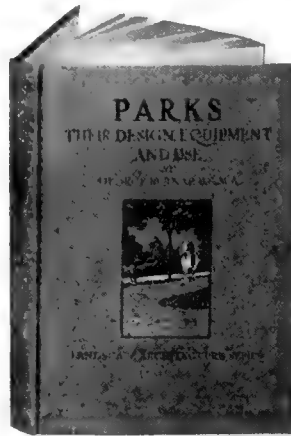
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Tenders will be received by the undersigned up to and including the 1st day of February, 1917, for the right to cut pulpwood and pine timber on a certain area situated on the Black Sturgeon River and other territory adjacent thereto, in the District of Thunder Bay.

Tenderers shall state the amount per cord on pulpwood, and per thousand feet board measure, on pine, that they are prepared to pay as a bonus in addition to dues of 40 cents per cord for spruce, and 20 cents per cord for other pulpwoods, and \$2.00 per thousand feet, board measure, for pine, or such other rates as may from time to time be fixed by the Lieutenant-Governor-in-Council, for the right to operate a pulp mill and a paper mill on or near the area referred to.

Such tenderers shall be required to erect a mill or mills on or near the territory and to manufacture the wood into pulp and paper in the Province of Ontario.

Parties making tender will be required to deposit with their tender a marked cheque, payable to the Honourable the Treasurer of the Province of Ontario, for ten thousand dollars (\$10,000), which amount will be forfeited in the event of their not entering into agreement to carry out conditions, etc. The said \$10,000 will be applied on account of bonus dues as they accrue, but the regulation dues, as mentioned above, will require to be paid in the usual manner as returns of cutting of wood and timber are received.

The highest or any tender not necessarily accepted.

For particulars as to description of territory, capital to be invested, etc., apply to the undersigned,

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