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Forest Vegetation of the Upper Mississippi

L. H. Pammel
These two papers cover a large territory, while Hitchcock's Catalogue of the "Anthophyta and Pteridophyta of Ames," is limited in its scope, but includes, perhaps, nearly all of the woody plants within a radius of thirty miles. Bessey's list contains sixty-one trees and sixty-four shrubs, making one hundred and twenty-five woody plants. When Nebraska is more fully explored a few more may be added. Hitchcock's catalogue only gives seventy-five. Within a radius of thirty miles several more species probably occur, but the number will certainly not reach much beyond eighty. In the region about La Crosse, Wisconsin, one hundred and fifteen are enumerated. The genera Crataegus, Salix and Fraxinus carefully worked over will probably bring the number close to one hundred and twenty. Three of the species enumerated above have escaped from cultivation and a fourth has been naturalized. Comptonia asplenifolia, Picea nigra and Thuja occidentalis may still be found within this range. Several species named are scarcely shrubby. On the whole the region is well represented in woody plants. With few exceptions the species are northern, Juglans nigra, Morus rubra, Gymnocladus dioicus, have reached nearly their northern limit.

FOREST VEGETATION OF THE UPPER MISSISSIPPI.

BY L. H. PAMMEL.

The paper before the Academy consisted in a verbal communication of the salient features of the forest vegetation. It was afterward written out in full and sent to Garden and Forest (See Vol. IV, pp. 460, 472 and 531). As the paper may be of general interest to Iowa readers I give it essentially as it appeared in Garden and Forest. A few notes have been added.

The Mississippi river and its tributaries, from Trempealeau, Wisconsin, to Dubuque, Iowa, are enclosed by bluffs, varying from two hundred to six hundred feet high. At Dubuque they are much lower than at La Crosse; in the latter place they are something more than five hundred feet above the level of Lake Michigan; sometimes they present steep, sandy rocks, in other places they are covered with a dense growth of trees. The region is well watered by numerous small streams emptying into the Mississippi, while it contains a number of streams of good size, as the Wisconsin, Black, La Crosse, Root and Turkey rivers. The smaller as well as the larger streams are well timbered with Oaks, Poplars, Birches, Maples, Hickories, Butternut, Walnut, Plums, Cherries, a few Conifers and southward, the Coffee-tree and Honey-Locust.

Much has been written concerning soils and the character of the vegetation. It is indeed a puzzling question, and I doubt whether it can truly be
said that certain species, strictly confine themselves to certain definite soils, yet certain trees, as well as herbaceous plants, may preponderate in certain soils. Perhaps this may be due to the physical condition of the soil, rather than its chemical constitution.

The Soft Maple (Acer saccharinum, L.), Red Birch (Betula nigra, L.), are the predominating trees in the Mississippi, Wisconsin and Black river bottoms. They also follow up the smaller streams which flow into these rivers, but as soon as these streams are left these trees become rare. The Soft Maple and Black Birch occur most numerously where the lands are subject to overflows every year. Most of the Oaks never occur in such situations, yet the Swamp White Oak (Quercus bicolor, Wild.) is an exception.

The only place where this species occurs is in the low, sandy and black bottom lands of the Mississippi and Black rivers. The White Pine only occurs in the sandy rocks or sandy loam soil of the region, always near streams, but in the northern part of La Crosse county it is encroaching on the loamy soil. The Tamarack (Larix laricina) only occurs in cold, wet swamps.

The soils of the region may be classed under sandy, loamy, calcareous, alluvial and peaty. The greatest areas of sandy soil occur near the mouths of the rivers. (This is not true for the interior of the State.) These sand prairies are not, however numerous on the west side of the river. As an illustration, at La Crosse, Wisconsin, there is a sand prairie some eight miles long and from one-half to three miles wide. The only arboreal vegetation growing on these soils are two species of Oak, Burr Oak (Quercus macrocarpa, Michx.), Black Oak (Q. tinctoria, Bartram), and occasionally the Swamp White Oak (Quercus bicolor, Wild.)

These trees, however, only occur in close proximity to the Mississippi bottoms. Other sand prairies similar to this one occur at Trempleau and Prairie du Chien, Wisconsin.

As regards the herbaceous vegetation on these prairies it might be said that it is a typical prairie flora. Liatris cylindrica, Verbenas stricta, Baptisia leucantha, Petalostemon violaceus, P. candidus, Oenothera rhombipetala, Bouteloua hirsuta, B. racemosa, etc., occur very frequently, though the Sand Bur (Cenchrus tribuloides) is the most characteristic plant where the soil has been plowed or loosened by the winds.

The calcareous soils occupy the tops of the hills and are of smaller extent near La Crosse, Wisconsin, than Dubuque, Iowa. Birches, especially the Canoe Birch (Betula papyrifera, Marshall), are a most marked feature of it; but this species is by no means confined to soils of this character. Two other plants only occur, so far as I have observed, in this region on the calcareous soils; they are Zygadenus elegans and Camptosorus rhizophyllus. Loamy soils are by far the most abundant; they occur on the slightly rolling ridges and in the valleys. The White Oak (Quercus alba, L.) grows excellently in such soil. Alluvial soil does not occupy great areas, except at the mouths of some rivers. The great bottoms of the Mississippi consist mostly of a sandy soil, covered over in some places with a black, rich soil. The White Elm, Box Elder, and Soft Maple are common.

The peaty soils are impassable during early spring and summer. Few trees are able to grow—only an occasional Willow or Tamarack. The bulk of the vegetation consists of species of Carex and Scirpus. Now and then Lilium canadense Cypripedium spectabile, or, here and there patches
of *Drosera ratundifolia* and *Pogonia ophioglossoides*, where the soil is very peaty and wet, appear.

During the past thirty years some important changes have taken place in the growth of timber along the river. The pioneer settler found little timber on the hills, except those with a northern slope. The timber standing on the sunny side was usually of poor quality, owing to numerous fires. Now, these lands are mostly fenced and fires are kept out, at least by the more enterprising farmers. The bleak hills are being rapidly covered with a forest growth.

It is not an uncommon thing to observe patches of Hazel (*Corylus americana*, Walt.) beyond the outskirts of the timber; here, in the course of a few years, will be found Oaks, Birches, Hickories and Poplars. The humus formed where Hazel grows is extremely rich and fertile, and I doubt whether trees could cover our treeless hills very fast without its help.

The best Oak growing along the Upper Mississippi is the White Oak (*Quercus alba*, L.). It is not uncommon to find trees with trunks eight to twelve feet in circumference. This species once covered a considerable portion of the ridges, especially on clay soil. The shaded slope on which the snow long remains in the spring is also a favorable situation for it. Young growth of White Oak is rapidly covering situations of this character, which formerly contained no timber. Flattened expansions of the stem are found just underneath the surface of the ground. From these arise a number of trunks. It is not improbable that, before the country was settled, late fires in spring kept the forest growth down, but after the cessation of fires a vigorous growth started. The timber of the White Oak is uniformly straighter and easier to cut than the Scarlet Oak (*Q. coccinea*, Wang) or Black Oak (*Q. tinctoria*, Bartram). These Oaks grow in more exposed localities where the soil is drier and vegetation starts earlier in the spring, and for this reason fires usually damaged them more than any of the others. The old timber is usually gnarled and hard to split. The young growth is, however, straight and easy to work where fires are kept out. The soils on which they occur vary considerably. They do well on sandy, gravelly soil, as well as on clay and black soil, and even make considerable growth on poor, sandy soil.

*Q. coccinea*, Wang, is the more common species, although the forms are puzzling. The Red Oak (*Q. rubra*, L.) is the finest of the Oaks in this region so far as beauty is concerned. The trees are tall and straight, and sometimes yield five cords of wood. It is not an uncommon thing for them to yield three cords. The wood is easily worked, and this is owing largely to the locality and soil where the species usually grows. The large trees were less effected by the early forest fires than were the Black Oaks. The Red Oak occurs principally on shaded hill-slopes, where the snow long remains on the ground, also on clay ridges and black bottom lands. Young trees of *Q. rubra*, are the most easily recognizable of the Black Oaks when growing in such localities. Smooth bark and straight trunk, with few lateral branches distinguish them at once from specimens of *Q. tinctoria* and *Q. coccinea*.

One of the most variable Oaks, at least so far as general appearances go, is the Bur Oak (*Q. macrocarpa*, Michx.). On the sandy soil it is diminutive in size, producing numerous lateral branches. Here it is a spreading tree.
IOWA ACADEMY OF SCIENCES.

On the poor sandy soil between the Black and La Crosse rivers it is the most common Oak. On clay and rocky soil it occurs mainly in small groups. Some thirty miles east of La Crosse, in the Kickapoo Valley, Bur Oak is a most valuable forest tree. The trunk is straight with but few large lateral branches. In its habit it is wholly unlike the form growing on sandy, rocky soil. Many trees are ten feet in circumference. It does not grow in isolated groups, but acres are covered almost entirely with this species. It also occurs in the rich alluvial bottoms of various streams. The Swamp White Oak (Q. bicolor, Willd.) occurs only in the bottoms of the Black and Mississippi rivers. A large number of small trees occur near North Bend, Wisconsin. I have observed a few more just below La Crosse. It becomes more common southward; and a considerable number were observed near Turkey River Junction, Iowa. No large trees have been seen, though Mr. J. S. Harris informs me that he noticed some near La Crescent, Minnesota, many years ago. The only other Oak I have seen is Q. Muhlenbergii, Engelm. It occurred in considerable numbers on the south slope of a limestone bluff just west of North McGregor, Iowa.

The most conspicuous Maple is the Soft Maple (Acer saccharinum, L.) It occurs everywhere along the Mississippi, Black and Wisconsin rivers and their tributaries. It forms more than one-half of the forest vegetation of the Mississippi river, but becomes less common as the sources of the smaller streams are reached. It grows where the lands are usually subject to overflow, and the soil is sandy or alluvial. The Red Maple (Acer rubrum, L.) is not a common species. It occurs in the interior of the country, away from the Mississippi, on the black, sandy loam. Although the Sugar Maple (Acer barbatum, Michx.) occurs in the rich, rocky soil along the Mississippi river, it is most common in the interior of Wisconsin, away from the river. On low ridges drained by the Kickapoo river it is one of the most common of forest trees.

Acer spicatum Lam., although not a forest tree, deserves mention. It grows in sheltered situations, frequently overhanging sandy rocks, about La Crosse and Galesville. Between Dubuque and McGregor, Iowa, it grows in shaded, moist situations, in calcareous soils, commonly with Sambucus racemosa, L.

The Ash-leaved Maple (Acer negundo, L.) occurs in groups in the richer soils of ravines and bottom lands; it is seldom found in the bottom proper of the Mississippi river.

Two species of Hickory have been observed. Shell Bark (Hicoria ovata) and the Pignut Hickory (H. glabra, Mill., Britton). Both species attain considerable size. The habits of the trees are quite different. H. ovata grows on clay soil, usually in groups. H. glabra grows on various soils, such as rocky, sandy, and along creek-bottoms. Shaded and moist localities are favorable to its growth, which is much more rapid than that of H. ovata. The Butternut (Juglans cinerea L.) is much more common than the Black Walnut (J. nigra, L.), although both are found on the rocky banks of the Mississippi, and the Butternut is abundant in sandy and gravelly soil along the Kickapoo river, while Black Walnut was not observed in this region. The latter tree is confined quite closely to the immediate tributaries of the Mississippi. Along the Badaxe river and smaller streams about La Crosse it is quite common, but as the sources of the stream
are reached it gradually diminishes in numbers. It needs a much richer soil than the Butternut.

The Cottonwood (*Populus monilifera*, Ait.) grows abundantly along the Mississippi river in bottoms, where both sandy and rich soil seem favorable for its development, and the trees are often of very large size. They are seldom found, however, on the uplands away from the streams except as recent introductions. The species is now sometimes found in the neighborhood of stone quarries in the loose clay soil. Trembling Aspen (*Populus tremuloides*, Michx.) is common in the rich, black soils of second bottoms, or the humus soil on the ridges. Near Dubuque it occurs around rocky ledges. The species grows in groups, sometimes several acres in extent. It is a short-lived tree, and is followed by more useful trees, like the Oak. The Large Poplar (*P. grandidentata*, Michx.) is less common than the last. It is found in more or less isolated groups in sandy and clay soils, and its growth is more rapid than that of the Trembling Aspen.

A few trees of the Sycamore (*Platanus occidentalis* L.) were observed at Turkey River Junction, Iowa. From this point southward it is more frequent in the Mississippi river bottoms.

The Hackberry (* Celtis occidentalis*, L.) occurs in rich soil of the bottoms of Root river and other streams; and not infrequently it is found on the rocky limestone cliffs, as at North McGregor, Iowa. It is a tree which can adapt itself to a variety of soils, and when cultivated does admirably on poor, sandy soil.

The Birches are fairly well represented, the most common species being the River Birch (*Betula inga*, L.) It, with the Soft Maple, more typifies the timbered region of the Mississippi bottoms than any other tree. The Red, or River Birch, diminishes in numbers southward. The Canoe Birch (*Betula papyrifera*, Michx.) is common about La Crosse and Trempealeau, Wisconsin, where it is usually found on the tops of the limestone bluffs, though also occurring in ravines and ridges as well as in sandy soil. On some of the rocky hills it is almost the only tree. It rarely attains great dimensions, except when growing in rich clay soil. Near Dubuque it is scarce. Mr. Reppert reports it from Muscatine; how much farther south it occurs in Iowa, I have not learned.

Yellow or Gray Birch (*B. lutea*, Michx.) is found more abundantly along the sandy, rocky cliffs of the Kickapoo. It also occurs near a Tamarack-swamp not far from La Crosse. It is not a common tree.

Quite a grove of small Kentucky Coffee-trees (*Gymnocladus dioicus*, L., Koch.) occurs south of La Crescent, in the Root river bottoms, and on the Wisconsin side there are two or three trees about seven miles below La Crosse. They are from twelve to fifteen feet high. The species is much more numerous on steep hillside near North McGregor, but none of the specimens are large. From this point southward it is more numerous. I noted it at Clayton, Turkey River Junction and Dubuque. It does not occur in the interior of the country east of La Crosse, although I have seen it cultivated in Madison, Wisconsin.

The Honey-Locust (*Gleditschia triacanthos*) was observed near Turkey River Junction, Iowa, though it occurs as far north as McGregor and perhaps further. It is occasionally cultivated in La Crosse. A fine tree occurs on Mississippi street, near Western avenue.
Pyrus coronaria, L. Since this paper has been written Prof. L. H. Bailey* has worked out our Wild Crab and established several species. I have not had an opportunity to study carefully the character of the Wild Crabs found about La Crosse. The Pyrus coronaria as described in older systematic works is very common in thickets, sometimes forming large groves. Beautiful large trees occur in isolated places.

Plum (Prunus americana, Marshall) is widely distributed. It comes up spontaneously everywhere. In rich bottom lands, clay soil, black sandy loam and rocky soils. Cheney Plum, now well known in cultivation, occurs wild near Chaseburg and elsewhere on the ridges. The species, if it be one, and there is certainly much doubt, is a very variable one. Prof. Bailey informs me that there are several good species in Prunus americana. Near La Crosse occur several distinct forms. I remember a case where one form occurring on a sunny hillside and ripens in August; the fruit is yellowish red. On the same sunny side of the hill, but some three quarters of a mile farther north, is another group. The plums are several weeks later, are longer and red.

Choke Cherry (Prunus virginiana, L.) is a very common species, forming small groves in clay and black soil. It frequently occurs at the bases of gullies or ravines. The Wild Red Cherry (Prunus pennsylvanica, L.) occurs in State Road Cooley near La Crosse on rocky hills in woods.

Wild Black Cherry (Prunus serotina, Ehr.) is widely distributed, though somewhat local. In Coon Valley it is abundant, forming quite an extensive grove. Trees from six to eight inches in diameter occur, though the tree never attains the size it does in Missouri and Illinois. Several species of Crataegus are common, but as I have not worked over my material carefully they are omitted.

Basswood (Tilia americana) is largely influenced by moisture. Rich, damp, grounds, sloping to the north, are favorable situations for it, and it is commonly found along the rich bottoms of the smaller streams and creeks. On the low bluffs and rivers of the Kickapoo river it is abundant.

The American Elm, or White Elm (Ulmus americana, L.), is a common tree everywhere along the creeks and streams near springs; occasionally, also, in upland woods in dry soil. The Red Elm (Ulmus fulva, Michx.) is not uncommon on the rocky slopes of hills along the Mississippi. It is absent or rare in the interior of the country. The Cork Elm (Ulmus racemosa, Thomas) is far less common than U. Americana. It occurs near La Crosse, especially in the Kickapoo valley near Bloomingdale, and I observed it also near Turkey River Junction, Iowa.

According to Mr. J. S. Harris, the Red Mulberry formerly grew by the Root river bottoms. I have not, however, seen it growing wild, though specimens said to have been brought from there are growing in Hon. J. W. Losey’s old lot on Fifth street. Scattered specimens were found at North McGregor, Iowa. Since writing the above I have learned of its occurrence at McGregor also, though evidently it only grows in sheltered situations as Mr. Kennyon writes. It is more numerous near Dubuque.

Two other conspicuous deciduous trees occur in rocky woods and shaded north slopes, Hop-Hornbeam (Ostrya virginica, Willd.) and Hornbeam (Carpinus caroliniana, Walter).

*American Garden, Vol. XII, No. 8, 1891, p. 469.
The White Pine (Pinus strobus, L.) is the most common conifer along the Black River. In the northern part of La Crosse and in the eastern part of Vernon county it is common on the sandy, loamy soil; near the Mississippi river it only occurs on the sandstone ledges. Small groups occur on stiff sandstone ledge near Oehler's Mills, Morrow Cooley and the sandstone ledge about seven miles from La Crosse near the Tamarack Swamp. Small groups also occur at Bangor. One small tree grew spontaneously in State Road Cooley on my father's farm. The nearest tree growing wild from this point is four miles. Large trees were once found at La Crescent, Minnesota, and quite a group of these Pines occurs near Clayton, Iowa. Northern Scrub Pine (Pinus banksiana, Lambert) occurs on the sandy prairie soil along the La Crosse and Black rivers, where little else grows besides Bouteloua hirsuta, Panicum virgatum, Aristida, Petalostemon violaceus, Pentstemon pubescens, Lupinus perennis, Viola delphinifolia, Anemone patens var. nuttalitiana, Potentilla argentea, Baptisia leucophaea. Norway or Red Pine (P. resinosa, Ait.) occurs in isolated places in sand bottoms of the Black River, and much more commonly on the sandy, rocky ledges of the Kickapoo River near Rockton.

Hemlock (Tsuga canadensis, Carr) I have not seen along the Mississippi River, nor does it occur near the mouths of the Black, La Crosse and Wisconsin Rivers, but near Rockton on the Kickapoo River, which is tributary of the Wisconsin River, numerous groups occur. Dwarf Cornel (Cornus canadensis), Trailing Arbutus or May Flower (Epigaea repens) and Clintonia borealis as well as ferns like Asplenium thelypteroides, Aspidium spinulosum var. intermediate, Onoclea struthiopteris, flourish under its shade among decaying logs and leaves.

Tamarack (Larix laricina) grows in the peaty swamps of La Crosse and Trempleau rivers. During dry portions of the year tamarack swamps are passable, but during wet years they are for the most part impassable. Owing to frequent overflows, which carry with them much soil from tilled land, these swamps are gradually filling up, and as a consequence, the Tamarack in these localities is losing ground. I found a small swamp near La Crescent, Minnesota, but in a few years this swamp will be a thing of the past.

Red Cedar (Juniperus virginiana, L.) grows along the Mississippi River in the sandy out-crops and limestone rocks, and most abundantly in the sandy bottoms of the Black River.

I have indicated, in a measure, the principal forest trees between Trempleau, Wisconsin, and Dubuque, Iowa. In the northern portion Betula papyrifera, B. nigra, Juglans cinerea, Larix, Pinus strobus are much more numerous than farther southward. Platanus occidentalis, Gleditschia triacanthos, Gymnocladus dioicus, Juglans nigra, Quercus muehlenbergii, and Morus rubra are southern trees which have moved northward along the Mississippi, and, therefore, are found close to its shores and the smaller streams tributary thereto.