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Hough's American Woods.

PART II.
THE

AMERICAN WOODS,

EXHIBITED BY ACTUAL SPECIMENS

AND WITH COPIOUS EXPLANATORY TEXT,

BY

ROMEYN B. HOUGH, B. A.

PART II.

REPRESENTING TWENTY-FIVE SPECIES

BY

TWENTY-SIX SETS OF SECTIONS.

LOWVILLE, N. Y., U. S. A.
PUBLISHED AND SECTIONS PREPARED BY THE AUTHOR.
1891.
TO
THE MEMORY OF
MY FATHER,
FRANKLIN B. HOUGH,

AS AN EXPRESSION OF GRATITUDE FOR THE CARE TAKEN TO INCLINE
MY FIRST THOUGHTS TO A CONTEMPLATION OF THE WORKS OF
NATURE, FOR GUIDANCE AND CONSTANT INSPIRATION
IN AFTER YEARS, AND BUT FOR WHOSE SUGGESTION THIS WORK WOULD NEVER HAVE APPEARED, IT IS MOST AFFECTIONATELY DEDICATED.
To

The Memory of

My Father

Franklin B. Hough
The necessity of more generally diffused information concerning the variety and importance of our forest trees is justification enough for the appearance of this work, especially at this day, when the demands of Forestry in this country are constantly more and more keenly felt. The work was undertaken at the suggestion of my father, whose intense interest in Forestry, and a kindred taste, at once gave me inspiration to the work. It was entered upon with the expectation of his valuable companionship and counsel during its progress, but, alas! that I was destined to have only at the outset, and, while I was then left ever to mourn the loss of a kind father, companion and teacher, the reader must fail to find in these pages that value and finish which his mind would have given them.

Among the happiest pictures of my memory are those in which I see my father's delight, as I would show to him, from time to time, my successful progress in devising a way of making the sections for this work, and if only for the happiness which its appearance would have caused him, could he have lived until this day, I have felt duty-bound to go on with it, even though left to do it alone.

The work is the outgrowth of one, of somewhat similar plan, proposed by my father some years since, but which he did not carry into effect. Its design is primarily and principally to show, in as compact and perfect a manner as possible, authentic specimens of our American woods, both native and introduced. For that end three sections, respectively transverse, radial and tangential to the grain (see Glossary), are made of each timber, sufficiently thin to allow in a measure the transmission of light, and securely mounted in well made frames.

The three planes above mentioned show the grain from all sides, so to speak, no plane being possible but that would be either one of them or a combination of them. The difficulty, however, of cutting a great number of sections exactly on those planes is obvious, so let it be understood that the terms, "transverse," "radial" and "tangential," are, in many cases, only approximately exact in their application.

My endeavor is to show, either in a part or all of the sections standing to represent a species, both the heart and sap-wood, but with some woods
as the Sitmich, for instance, where usually only the outermost ring, or a part of it, could be said to represent the sap-wood, the display of that is quite impossible. In certain other woods, as the Spruce, etc., the transition from sap to heart-wood is almost indistinguishable by any difference in color, and, although both may be shown in the sections, one can scarcely distinguish between them.

The sequence of the numbers given to the various species is of importance only to show the botanical arrangement within a given Part, each Part being independent of the others.

The text of this work has been added rather as a secondary matter, to supply to those not having it in other form, such information as is of importance, in connection with the wood specimens, to give a fairly good acquaintance with the trees represented. It contains little, if any thing, new to the botanist, but to others it is hoped it may be of some value.

In its preparation some use has been made of my father's Elements of Forestry, and thanks are due the publishers of that work — Messrs. Robert Clarke & Co. of Cincinnati, Ohio — for the use of cuts in reproducing a number of its illustrations. Other valuable books of reference have been the works of Drs. Gray, Wood and Bessey, LeMaout and Decaisne's Descriptive and Analytical Botany, Prof. C. S. Sargent's Report on the Forest Trees of North America (constituting Vol. IX, Ninth Census of the United States, 1880), Micheaux and Nuttall's North American Sylva, George B. Emerson's Trees and Shrubs of Massachusetts, D. J. Browne's Trees of America, etc.

The authenticity of the timbers represented in this work has been a subject of personal attention and special care on the part of the author. The trees selected for specimens have been identified in the field, before felling, while the leaves, flowers or fruit (one or more) have been obtainable, and he can, hence, vouch for the authenticity of every specimen represented.

Succeeding parts, uniform in style with Part I, and representing in each case twenty-five additional species, are planned to appear later, with the ultimate end in view, of representing, as nearly as possible, all of the American woods, or at least the most important, in such a series of volumes as this one.

Upon the reception which this meets in public favor, and upon the co-operation of those interested in the cause, must naturally depend the carrying out of that plan. It is hoped that greater experience and skill will enable us to obviate in future parts the faults which occur, from lack of those qualities, in this.

Notice of errors in this work will be thankfully received in hopes of profiting therefrom in the future.

Lowville, N. Y., March 30, 1888.
PREFACE TO PART II.

It is with feelings of mingled delight and regret that I close the work upon Part II of this series, and send it out to the many lovers of woods, who are anxiously awaiting it.

The favor with which Part I was received has been a real delight — a very gratifying reward for the time, labor and expense put upon it, with the consciousness that upon its success must depend the success of the whole work. While that favor has been all that could be hoped, still the requisite growth of the subscription list has been slow, owing to the difficulty of bringing the work, by means within reach, to the attention of those likely to be interested. The consequent delay in the appearance of Part II I regret exceedingly, but feel confident that no such interval will occur hereafter in the succession of the remaining parts of the series.

I feel great gratitude towards the many interested in the cause, who, by their expressions of approval and personal efforts in making the work known to others, have rendered great encouragement and very material aid.

In the preparation of this part I have, as before, to acknowledge with thanks the service kindly rendered by Rev. J. Hermann Wibbe and Mrs. Elizabeth G. Britton in determining the German, French and Spanish synonyms.

It is hoped that greater experience has enabled us to avoid in this part some at least of the faults so noticeable in the first, and promising unremitting zeal in the future to keep the work up to the standard, we hope to merit the continued good-will and favor of our patrons.
A KEY, BASED MAINLY UPON THE FLOWERS,

Designed as an Aid in the Identification of the Species represented in Parts I and II.

a. **Angiospermae** — seeds in a closed ovary.

b. Polypetalous — petals present and distinct.

c. Stamens numerous, more than 10, and

d. Calyx inferior — wholly free from the pistil or pistils.

e. Pistils numerous and cohering in a cone-like mass. **(Magnoliacae.)**

f. Anthers opening inward; leaves folded lengthwise in the bud (**Magnolia**), pointed at both ends, oval, thin and green both above and below.

ff. Anthers opening outward and leaves folded crosswise in the bud.

ee. Pistil solitary and

f. One-celled, style single, flowers perfect, stone of drupe horny (**Prunus**), turgid ovate, marginless; flowers in terminal racemes, leaves lance-oblong, thickish. ...... ............... .29. **P. serotina.**

ff. Compound as shown by the styles and cells of ovary; calyx valvate in the bud, deciduous (**Tiliaceae**); stamens somewhat polydelphous (**Tilia**) and with 5 petal-like scales opposite the petals .. 3. **T. americana.**

dd. Calyx superior — adnate to the ovary which is 2–5-celled with 2 ovules in each cell, carpels cartilaginous (**Pyrus**); leaves simple, glandless, serate, veins incurved, styles 5, united below ...... .30. **Pyrus Malus.**

c. Stamens few, not more than 10, alternate with the petals when of the same number.

d. Calyx inferior — free from the ovary.

e. Ovaries 2–5, separate; stamens distinct and inserted on the receptacle; trees with pinnately compound and uniformly opaque leaves.

4. **Ailanthus glandulosus.**

e. Ovary single, but compound as shown by the cells, styles or stigmas.

f. One-celled and one-seeded; styles or stigmas three; shrubs or trees with regular flowers (**Anacardiaceae**); leaves compound with 11–31 oblong lanceolate acuminate leaflets; common petiole densely villous and not winged; flowers in terminal thyrses...... .5. **Rhiz typhina.**

ff. Three-celled with two ovules in each; style single; flowers irregular; stamens 6–8 (**Aesculus**); fruit covered with prickles; leaves palmately compound with 7 obovate leaflets.... 6. **A. Hippocastanum.**

ee. Ovary single and simple with one parietal placenta, corolla subregular (not papilionaceous) and imbricated in aestivation.

ff. Flowers dioecious; stamens 10; tree unarmed.

27. **Gymnocladus canadensis.**

ff. Flowers polygamous; stamens 5; tree armed with thorns (**Gleditschia**) which are triple and pods linear.... ....... 28. **G. triacanthos.**

dd. Calyx superior — adnate to the ovary; flowers in umbels; stamens 5; styles 5; fruit drupe-like with 5 cells each with a single ovule (**Aralia**); arborescent and armed with prickles. ...... ... 8. **Aralia spinosa.**

bb. Apetalous — without petals.

c. Flowers not in catkins; pistil one, simple or compound, and the cells of the ovary containing 1–3 seeds each.

dd. Ovary inferior — adnate its whole length to the calyx-tube — 1-celled and 1-seeded; style 1 stigmatic down the side (**Nyssa**); fertile peduncle bearing each two or more flowers. ................. .9. **N. multiflora.**
**Key, Based Upon Flowers.**

**ad.** Ovary superior — free from the calyx.

e. Stipules sheathing the stem; trees with naked monoeccious flowers arranged in heads. ...............................13. **Platanus occidentalis.**

ee. Stipules not sheathing the stem or none.

g. Ovules a pair in each cell of the ovary which becomes in

f. Fruit a double samara; leaves simple and palmately veined (**Acer**).

h. Flowers appearing with the leaves in pendulous corymb (not sub sessile). ........................................7. **A. saccharinum.**

hh. Flowers appearing before the leaves in short umbels.

26. **A. dasycarpum.**

gg. Fruit a 1-celled and 1-seeded samara (**Fraxinus**); flowers dioecious; calyx persistent at the terete base of the samara; corolla none; leaflets stalked.

h. Branchlets and petioles glabrous; leaflets entire or nearly so.

10. **F. americana.**

hh. Branchlets and petioles velvety pubescent. 31. **F. pubescens.**

ff. Ovules single in each of the 1 or 2 cells of the ovary.

g. Anthers opening by uplifted valves; stigma single and entire; flowers dioecious; stamens 9; anthers 4-celled; involucre none; fruit an ovoid blue drupe with reddish pedicel. 32. **Sassafras officinale.**

gg. Anthers extrorse; stigma 2-cleft; fruit a 1-celled samara winged all round (**Ulmus**).

h. Flowers nearly sessile; samara not fringed; ciliate; leaves very rough above ........................................11. **U. fulva.**

hh. Flowers on drooping pedicels; samara ciliate-fringed; leaves smooth.

Bud-scales glabrous; flowers fascicled; branches not cork winged. ........................................38. **U. americana.**

Bud-scales downy-ciliate; flowers racemosed; branches croky winged ........................................34. **U. racemosa.**

ggg. Anthers introrse; fruit a dark purple drupe; leaves long-taper pointed. ........................................12. **Celtis occidentalis.**

cc. Flowers diclinous and one or both sorts in catkins.

d. Only one sort (the staminate flowers) in catkins.

e. Fertile flowers single or clustered; fruit naked; leaves pinnately compound (**Juglandaceae**).

f. Corolla present in the fertile flowers; fruit with valveless epicarp (**Juglans**).

Fruit ovate, oblong and viscid-hairy ..................... 14. **J. cinerea.**

gg. Fruit globose, roughly dotted (not viscid-hairy). 35. **J. nigra.**

ff. Corolla not present in the fertile flower; fruit with usually 4-valved epicarp (**Carya**).

Nut small and edible, depressed globular, shell hard, valves of the epicarp thick and distinct to base ........................................36. **C. alba.**

gg. Nut bitter, subglobose, shell tender, valves half united, sutures prominent. ........................................37. **C. amara.**

ee. Fertile flowers 1–3 together invested wholly or partly with an involucral covering; leaves simple (**Cupulifera**).

f. Involucre valveless, cup-like, composed of many scales and only partly inclosing the one nut, i. e., acorn (**Quercus**).

g. Acorns maturing the first year, sessile, leaves with rounded lobes.

h. Nut ¼ immersed in the tubercled cup; leaves deeply sinate-pinnatifid, oblong in outline and with obtuse rounded lobes.

38. **Q. alba.**

hh. Nut deeply immersed (half or sometimes quite entirely) in a cup composed of distinctly imbricated and hard pointed scales which form a fringe about its margin; leaves lyrate-pinnatifid most deeply in the middle ..........39. **Q. macrocarpa.**

gg. Acorns maturing the second year; nut ¼ immersed in a shallow cup composed of fine, closely appressed scales; leaves moderately pinnatifid and with 7–9 awn-pointed lobes .......... 15. **Q. rubra.**

ff. Involucre 2–4-valved, becoming hard and prickly and inclosing 1–3 sweet, edible, flattened, subglobose nuts; sterile flowers in catkins.

40. **Castanea vesca.**
**Key, Based Upon Flowers.**

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**ff.** Involucre 4-valved and inclosing two 3-cornered, edible nuts.  
16. *Fagus perriuginea.*

**cee.** Fertile flowers in short catkins; nuts small and achenium-like; sterile flowers destitute of calyx; leaves simple.

**f.** Nutlet inclosed in a bladder-like bag........41. *Ostrya Virginica.*

**ff.** Nutlet not inclosed but subtended by an enlarged leafy bract.  
42. *Carpinus Caroliniana.*

**dd.** Both staminate and pistillate flowers in catkins.

**e.** Ovary 1–2-celled with a single ovule in each cell; calyx scale-like or none; stigmas 2, filamentous; fertile flowers arranged 2 or 3 together under each scale of the cone-like catkin (*Betula*).

**f.** Trees with white bark and ovate leaves doubly serrate; veins hairy beneath; fertile catkins drooping.........43. *Papyracea.*

**ff.** Trees with yellowish bark; leaves short-petioled, smoothish; fertile catkins short and erect......................17. *B. Lutea.*

**ff'.** Trees with reddish-brown bark; leaves cordate-ovate; fertile catkins suberect.................................44. *B. Lenta.*

**e.** Ovary 1-celled and many-seeded, the seeds at maturity furnished with a hairy tuft (*Salicaceae*).

**f.** Bracts of the catkins entire; calyx wanting; stamens 2–7 (*Salix*); catkins peduncled, expanding with the leaves in late spring.

**g.** Ovaries pedicillate and glabrous; scales greenish-yellow, deciduous, stamens mostly 5; leaves lance-linear, tapering at each end.  
45. *S. nigra.*

**gg.** Ovaries sessile and glabrous; stamens 2; leaves lanceolate, tapering both ways; branches yellow ........46. *S. alba var. Vitellina.*

**ff'.** Bracts of the catkins lacerately fringed; calyx a disk-like cup; stamens 8–30, leaves broad (*Populus*).

**g.** Branchlets terete.

**h.** Leaves roundish ovate with large unequal sinuate teeth.  
18. *P. Grandidentata.*

**hh.** Leaves ovate; acuminate, finely serrate, whitish and reticulate-veined beneath.................47. *P. Balsamifera.*

**gg.** Branchlets slightly angular, leaves broadly deltoid.  
48. *P. Monolifera.*

**aa.** *Gymnospermae* — seeds naked, borne superficially on carpellary scales. Cone-bearing (*Conifera*).

**b.** Scales of cone many, each in the axil of a bract and bearing 2 inverted ovules; seeds winged.

**c.** Leaves evergreen, fascicled; cones maturing the second year (*Pinus*).

**d.** Leaves in 2s with long sheaths; cones about half as long as the leaves and with scales thickened at the apex but unarmored.. 10. *Pinus resinosa.*

**dd.** Leaves in 3s with short sheaths; cone about half as long as the leaves and with scales thickened at the apex and armed with a reflexed spine.  
49. *P. Rigida.*

**dd.** Leaves in 5s with very short sheaths; cones longer than the leaves and with scales not thickened at the ends, unarmored......50. *P. Strobus.*

**cc.** Leaves evergreen, scattered (not fascicled); cones with thin scales, maturing the first year (*Abies*).

**d.** Cones erect, cylindrical, large (3–4 in.) and with conspicuous bracts; leaves flat, linear .................... 22. *A. Balsamea.*

**dd.** Cones pendent and bracts inconspicuous.

**e.** Small, 8 lines or less, scales entire at tip; leaves linear.


**ee.** Larger, 1–1½ in., scales eroded at tip; leaves 4-angled...20. *A. Nigra.*

**ccc.** Leaves deciduous, soft, needle-shaped and in fascicles of many each; cones about 9 lines in length, scales thin (*Larix*) and with inflected margins.  
23. L. Americana.

**bb.** Scales of cone few, without bracts and each bearing 2–8 erect ovules.

**c.** Flowers monoecious; scales of the oblong cone dry and divergent at maturity; leaves evergreen......................25. *Thuja occidentalis.*

**cc.** Flowers dioecious; scales fleshy and consolidated, making a small, dark blue, berry-like fruit; leaves scale-like and imbricated in 4 rows.

25. *Juniperus Virginiana.*
A KEY, BASED UPON THE LEAVES,

Designed as an Aid in Identifying the Species represented in Parts I and II when out of Season for procuring the flowers.

N. B.—In this Key no pretension is made to exclude species not of this series, and hence it is necessary in all cases to confirm identification, by a careful comparison with the more extensive description given of the species in its proper place.

a. Deciduous Leaves—falling in autumn.

b. Simple Leaves.

c. Laminate— with well marked blade and petiole.

d. Main rib single — pinnately veined.

e. Entire or nearly so, pointed at both ends and alternate.

f. Large, 5-10 in. long and thinnish..............1. Magnolia acuminata.

f². Small, 2-5 in. long, of thicker and firmer texture.

f⁴. Serrate, serulate or dentate.

f⁵. Inequilateral and cordate or truncate at base.

f⁷. Large, 5-10 in. long and thinnish..............1. Magnolia acuminata.

f⁸. Small, 2-5 in. long, of thicker and firmer texture.

f⁹. Serrate, serulate or dentate.

f¹⁰. Inequilateral and cordate or truncate at base.

f¹¹. Ovate-orbicular, large, 4-5 in. or more in length.

f¹². Ovate, long-taper-pointed from a broad base.

f¹³. Ovate, oblong and

h. Very rough, especially above, rugose.............11. Ulmus fulva.

h². Smoothish and

Flowers and fruit in fascicles.............33. Ulmus americana.

h³. Ovate-and-oblong

h⁴. Ovate-oblong

Coarsely serrate with remote teeth, one at the end of each vein, ciliate and covered with silky white hairs.

16. Fagus ferruginea.

Doubly and sharply serrate, nutlet inclosed in a papery sac.

41. Ostrya virginiana.

Unequally and sharply serrate, nutlet subtended by a leafy bract..................42. Carpinus Caroliniana.

h⁵. Ovate and

i. Finely and closely serrate, smooth, whitish and reticulate-veined beneath.............47. Populus balsamifera.
Key, Based Upon Leaves.

i. Doubly serrate and
   j. Thinish; petioles downy and of aromatic flavor.
      Bark of trunk yellowish-gray............. 17. Betula lutea.
      Bark reddish-brown...................... 44. Betula lenta.
   j'. Thickish and bark white............. 43. Betula papyracea.

h. Orbicular-ovate with large irregular teeth and long petiole.
   18. Populus grandidentata.

f. Veins incurved, leaves thickish,
    Smooth, petioles with 2-4 glands........ 29. Prunus serotina.
    Downy on under surface and petioles.... 30. Pyrus Malus.

f'. Equilateral and acute at base, tapering both ways.
    Linear-lanceolate, tomentose on midrib above and petiole.
    45. Salix nigra.

f. Obovate or oblong and lyrate-pinnatifid.
    39. Quercus macrocarpa.

f. Broad, truncate at both base and apex, and with two spreading lobes
   on each side......................... 2. Liriodendron Tulipifera.

d. Main ribs several — palmately-veined, etc.
   e. Rib single at first but soon sending off a strong vein on each side and
      leaves 3-lobed, 2-lobed or entire........ 32. Sassafras officinale.
   e'. Ribs three at first, but soon five by branching, leaves alternate, base
      of petiole concave and fitting over the axillary bud.
      Moderately incised with broad divisions and rounded sinuses.
      13. Platanus occidentalis.

f. Needle-shaped — without distinction of blade and petiole — short, about 1
   in. in length, soft and in fascicles of many each... 23. Larix Americana.

b. Compound Leaves.
   c. Palmate, with 7 obovate, serrate leaflets........ 6. Aesculus hippocastanum.
   c'. Pinnate and with an odd terminal leaflet.

   d. Leaflets all petiolulate.
   e. Leaflets numerous, 21-41 each with one or two pairs of glandular teeth
      at its base....................... 4. Ailanthus glandulosus.
KEY, BASED UPON LEAVES.

e'. Leaflets 7-9, ovate or lance-oblung entire or obscurely serrate.
   Petioles and branchlets glabrous..............10. FRAXINUS AMERICANA.
   Petioles and branchlets velvety pubescent...31. FRAXINUS PUBESCENS.

d'. Leaflets sessile or subsessile.

c. Numerous (15-17) and pubescent, especially along the petioles and rachis.

f. Leaflets ovate-lanceolate, finely serrate; pubescence of short rust-colored
   clamy hairs.
   Fruit subovoid, viscid-pubescent.............14. JUGLANS CINEREA.
   Fruit globose, roughly dotted (not viscid-pubescent).

f'. Leaflets lance-oblung, coarsely serrate; pubescence of copious, longer
   and whiter hairs ..................5. RHUS TYPHINA.

e'. Seven to 11 leaflets, the terminal sub sessile....37. CARYA AMARA.

e'. Five leaflets, the terminal petiolulate........36. CARYA ALBA.

b'. Decmpound Leaves.

c. Petioles smooth and
   Leaves regularly bipinnate excepting for the lowest pair of single leaflets;
   leaflets stalked.....................27. GYMNOCLADUS CANADENSIS.
   Leaves irregularly bipinnate, leaflets small and sessile.
        28. GLEDITSCHIA TRIACANTHOS.

c'. Petioles prickly, leaves large with ovate, sessile, serrate leaflets.

b'. Needle-shaped and quite stiff, pointing every way.

c. Long, 1 in. or more, in fascicles of
   Two each, a broad membranous sheath enclosing the base of each
   fascicle.............................19. PINUS RESINOSA.
   Three each, sheath short..................50. PINUS RIGIDA.
   Five each, sheath deciduous............49. PINUS STROBUS.

c'. Short, 8 lines or less, scattered (not in fascicles), 4-angled, usually more or
   less curved..........................20. ABIES NIGRA.

b'. Linear, small, flat and diverging in two directions.

c. Petioled, obscurely denticulate, 8 lines or less in length.

b'. Scale-like or awl-shaped.

c. Imbricated and closely appressed in four ranks, but making a conspicuously
   flat and two-edged branchlet..............24. THUJA OCCIDENTALIS.

c'. Scale-like leaves smaller, appressed in four ranks and making a rather
   4-angled than flat branchlet. Awl-shaped leaves arranged in whorls of
   three each......................25. JUNIPERUS VIRGINIANA.
A KEY, BASED UPON THE FRUIT,

Designed as an Aid in Identifying the Species represented in Parts I and II when in Season for procuring the Fruit.

N. B.—The remarks concerning the use of the Key based upon the Leaves are equally true with reference to this.

a. Free Fruit—formed by the ripening of a single pistil either simple or compound.

b. Indehiscent pericarp.

c. Samara—dry, 1-celled, 1-seeded and with 1-2 membranous wings.

d. In terminal panicles; wing somewhat oblong-lanceolate, with a lenticular seed at about its center, and beyond which the wing is twisted (Ailanthus)...

d'. In umbellate corymbs, each pedicel supporting a pair of samaræ with oblongate wings obtuse at the apex and with main rib on outer margin (Acer).

Fruit maturing in the fall, wings slightly divergent.

7. A. SACCHARINUM.

Fruit maturing in early summer, wings widely divergent.

26. A. DASYCARPUM.

d'. In axillary racemes or panicles, winged at the apex with a more or less lanceolate obtuse wing (Fraxinus), terete at the base—the seed portion and Petioles and branchlets smooth.................10. F. AMERICANA.

velvety pubescent ....... 31. F. PUBESCENS.

d'. In lateral fascicles or clusters, winged all round (Ulmus).

Sessile or nearly so, cell pubescent and margin not ciliate..11. U. FULVA.

In fascicles, cell smooth, margin densely ciliate .......33. U. AMERICANA.

In racemes, cell pubescent, margin ciliate .......... 34. U. RACEMOSA.

c'. Drupe or drupe-like and with a single seed.

d. Fibro-fleshy and dryish pericarp.

e. Small, subglobose (Rhus) in terminal thyrses and clothed with crimson-acid hairs.........................5. RHUS TYPHINA.

e'. Large, about 2 in. in length, with edible embryo (Juglans).

Ovoid or oblong and clothed with brownish, fragrant-viscid hairs.

14. J. CINEREA.

Globose, roughly dotted (not viscid hairy).......... 35. J. NIGRA.

d'. Fleshy pericarp.

e. Ovoid and

Clustered two or three together on a single axillary peduncle; bluish-black, stone striated....................9. NYSSA MULTIFLORA.

Racemed, bluish and with short, fleshy, reddish pedicels.

32. SASSAFRAS OFFICINALE.

29. Prunus serotina.

c. Drupe-like but containing more than one seed, subglobose.

d. Five-seeded and crowned with the persistent calyx-teeth and styles (Aralia), purple-black, numerous, in panicked umbels. 8. A. spinosa.

d'. Two to five-seeded, bluish-black with white bloom, scaly bracted underneath (Juniperus). 25. J. Virginiana.

c'. Nut—hard, single coat, and furnished with an involucral cup or covering.

d. Ovoid oblong or ellipsoidal, surrounded at its base with an involucral cup (Quercus) which is

e. Shallow, saucer-shaped and composed of

21. Q. rubra.

Rough-tubercled, closely-appressed scales, on new wood of the season.

38. Q. alba.

c. Deep and composed of distinctly imbricated scales, the upper ones usually filiform and making a fringed margin; on new wood of the season.

39. Quercus macrocarpa.

d. Club-shaped, short, surrounded with stiff hairs, tipped with the persistent recurved style and arranged in globular heads.

13. Platanus occidentalis.

d'. Achenium-like, small and borne in short catkins.

Inclosed in a membranous inflated sac, catkin hop-like.

41. Ostrya Virginica.

Subtended by an enlarged leafy bract.

42. Carpinus Caroliniana.

c. Nut-like, but not invested with an involucre, globose, about as large as peas and arranged in cymes with a large, leaf-like bract attached to each peduncle (Tilia).

3. T. Americana.

c'. Pod (legume) which is

Oblong, flat, about 2 in. broad and curved.

27. Gymnocladus Canadensis.

Linear, twisted and contorted, about 1 in. broad.

28. Gleditschia triacanthos.

c'. Pome, globular

30. Pyrus Malus.

b. Dehiscence pericarp.

c. Subglobose, and

d. Coriaceous, dehiscence by

2-3 valves and containing one or very few large seeds with smooth shining coat and a large scar (Esacus), fruit prickly and leaflets 7.

6. Aesculus hippocastanum.

4 valves

Parting the whole length, nut thick, hard, whitish and embryo edible.

36. Caray alba.

Parting half way and containing a thin-shelled, whitish and bitter nut.

37. Caray amara.

d'. Covered with spines; dehiscence by 4 valves.

Nuts sharply three-angled, 2 together, involucre soft-prickly.

16. Fagus ferruginea.

Nuts subovoid, flattened, 1-3 together, involucral spines very sharp and hard.

40. Castanea vesca, var. Americana.
c². Small, ovoid-lanceolate pods arranged in catkins, opening by two valves and containing numerous seeds furnished with silky down; leaves
Oribicular-ovate, unequally dentate.......18. Populus grandidentata.
Ovate, closely serrate, whitish and reticulate-veined beneath.
    47. Populus balsamifera.
Linear-lanceolate, tomentose on midrib above and petiole.
    45. Salix nigra.
Lanceolate or elliptic-lanceolate, smooth above.
    46. Salix alba, var. Vitellina.

a³. Aggregated Fruit — composed of many carpels, either closed or open and cohering or closely massed together, forming a cone.

b. Scales of the cone open carpels (Conifera).

c. Scales many, persistent and spreading at maturity, each subtended by a bract; ovules 2, inverted.

d. Maturing the year after flowering (Pinus).

e. Cones ovoid pyramidal, about 2 inches long, carpellary scales thickened at the apex and
Smooth (unarmed) .... ..........................19. Pinus resinosa.
Armed with a recurved prickle....... .................50. P. rigida.

e². Cylindric, 4–6 in. long, scales thin and unarmed .... 49 P. Strobus.

d'. Maturing the first season — the autumn after blossoming.

e. Ovoid or oblong, ¼ in. long, pendent; bracts inconspicuous; scales persistent on the axis, thin and with eroded tip.......20. Abies nigra.

e². Ovoid, small (8 lines or less), pendent, scales rounded and entire at tip.

e³. Cylindrical, large (2–4 in.), erect; bracts conspicuous, exserted; scales falling from the axis at maturity ..................22. Abies balsamea.

e'⁴. Ovoid or roundish, small, 9 lines or less, scales persistent on the axis at maturity .................. .................23. Larix americanana.

c. Scales few, persistent, bractless; ovules 2–8, erect; cone oblong with oblong loosely imbricated scales somewhat thickened at the tip; seed winged all round........................................................................24. Thuja occidentalis.

b². Scales 3-lobed bracts each subtending 2–3 closed, indehiscent carpels — miniature samarae (Betula).
Cones erect, short, scales thin and with barely spreading lobes, wings of
seed not broader than the body. ........ ..........................17. B. lutea.
Cones suberect, ovoid-oblong; scales thicker and with short divergent lobes, wing not broader than the body.................................44. B. Lenta.
Cones pendent, scales glabrous and with short divergent lobes; wing of
seed much broader than the body....................43. B. Papyracea.

b³. Scales closed carpels, growing from an elongated receptacle and consolidated together.

c. Dehiscent at maturity along the medium line of the back, and letting out
each 1–2 berry-like seeds suspended by extensile threads (Magnolia).
    1. M. Acuminata.

c². Indehiscent at maturity and falling away as samarae.
    2. Liriodendron Tulipifera.
A SYSTEMATIC STUDY

OF THE

SPECIES WHOSE WOODS ARE REPRESENTED IN THE ACCOMPANYING SECTIONS.

The timbers comprised in the series, which this text is designed to accompany, belong to what are known, botanically speaking, as Flowering and Exogenous Plants. At the outset, therefore, we will, once for all, define these groups; and, as the characters herein given are equally true of all the species enumerated in the following pages, they need not be repeated in the further definition of the various sub-groups and species.

FLOWERING or PHÆNOGAMOUS PLANTS.

Vegetables producing flowers which consist essentially of stamens and pistils, the latter bearing ovules or seeds.

In distinction from the Flowering Plants are the Flowerless or Cryptogamous Plants, comprising the rest of the vegetable kingdom, from the very simply organized Slime Moulds and Bacteria up to the highly organized Ferns and Club-Mosses. But in the study of timbers this group is unimportant, as only in a few rare cases do any of its representatives attain the dimensions of trees. Those exceptions are the Tree-Ferns of tropical countries — gigantic ferns, which sometimes attain the height of fifty or sixty feet, with straight shafts quite like tree trunks and tops consisting of a bunch of enormous plume-like fronds. They, however, are of practically no value as timber.

EXOGENOUS or DICOTYLEDONOUS PLANTS.

Flowering plants whose stems consist of a central column of pith surrounded by wood in concentric layers, and this in turn by bark; the stems increasing in thickness by the addition of a new layer each year to the wood externally and to the bark internally. Leaves mostly netted-veined. First leaves of the embryo (cotyledons) two and opposite, or (in the Coniferae) several in a whorl. Parts of the flower in fours or fives, very rarely in threes.

A second class of Flowering Plants and comprising the rest of the group is the Endogenous or Monocotyledonous Plants, characterized by having stems in which the
wood occurs as threads or bundles running through a cellular, pith-like tissue so that a transverse section exhibits the wood as dots and not in concentric rings. Leaves mostly parallel-veined. Embryo with single cotyledon, or rarely two, and then alternate and unequal. Parts of the flower generally in threes. In southern United States and elsewhere in or near the tropics trees are found, such as the Palms, etc., which belong to this class, but none that we have to do with at present.

Exogenous plants are subdivided into two well-marked groups or subclasses — Angiospermae and Gymnospermae. The former includes by far the greater part of the Flowering Plants, and is represented in Part I of this work by eighteen species. Let it be understood, therefore, that its characters, omitted in further descriptions, apply equally to all the species up to and including the eighteenth.

ANGIOSPERMÆ.

Flowering, exogenous plants in which there is a complete pistil — with stigma and closed ovary — containing ovules which develop into seeds at maturity. This sub-class comprises many groups of plants known as Orders, a few of which will be taken up in the following pages. Considering them in the sequence commonly accepted by botanists, we will first characterize the

ORDER SAPINDACEÆ: SOAPBERRY FAMILY.

Leaves simple or compound. Flowers polypetalous, often irregular and mostly symmetrical; sepals and petals each 4–5, imbricated in the bud, the petals inserted with the 5–10 stamens on a perigynous or hypogynous disk; ovary 2–3-celled and lobed, usually 1–2 ovules in each cell, embryo mostly convoluted; no albumen. Fruit a membranous, inflated pod, a leathery thick subspherical pod with nut-like seeds, or a winged samara.

GENUS ACER, TORN.

Leaves opposite, simple, palmately-veined, 5 or occasionally 3-lobed; stipules none. Flowers small, in axillary racemes or corymbs, regular, polygamo-dioecious, usually unsymmetrical; pedicels not jointed; sepals 5 (or 4–9), more or less united, colored; petals sometimes wanting, but, when present, 5 (or 4–9), equal and furnished with short claws; stamens, commonly 8; ovary 2-lobed, formed of 2 united carpels, each bearing 2 ovules, only one of which commonly attains maturity; styles 2, long and slender, united only below and stigmatic down the inside. Fruit a double samara, finally separating when mature and ready to fall, the wings strengthened by a rib along one margin; cotyledons, long and thin.

(Ancient Latin name of the Maple.)

26. ACER DASYCARPUM, EHRHART.

SILVER-LEAVED MAPLE, WHITE OR SILVER MAPLE, SOFT MAPLE.

Ger., Silberblätteriger Ahorn; Fr., Erable blanc; Sp., Arce con hojas plateadas.

Specific Characters:—Leaves truncated at the base, deeply 5-lobed with rather acute sinuses and incisely toothed lobes, silvery-white and smooth beneath, but
downy while young. *Fruits* in fascicles or umbels with short pedicels, greenish-yellow and appearing before the leaves; ovaries and young fruit downy; petals none. *Fruit* with large divergent wings and smooth at maturity (though downy when young).

(The specific name, *dasycarpum*, is from the Greek δασύς, hairy, and Καρπός, fruit.)

A handsome, graceful tree with wide-spreading top, more or less pendant branches, and light airy foliage. The bark of the trunk is moderately rough with not very firmly adherent longitudinal ridges and of a brownish gray color. Growing as it does along the margins of ponds and still-water, its graceful sprays and handsome party-colored leaves seem by reflection in the mirror surface doubly beautiful. Isolated trees in such situations sometimes have trunks 5 ft. (1.50 m.) or more in diameter. They are short though as compared with the slim, straight trunks of the forests where the trees are sometimes found 100 ft. (30 m.) or rarely more in height.

Habitat.—South-eastern Canada and eastern United States generally, south to Florida and west to a little beyond the Mississippi river, growing along wet bottom lands and especially such tracts as are inundated during the spring freshets.

Physical Properties.—Wood light, hard (but soft as compared with the Hard Maple), rather brittle, strong, compact, easily marked, and on account of its very fine grain susceptible of an exceedingly smooth polish. It soon perishes on exposure. The heart-wood is of a reddish-brown color and the sap-wood a delicate creamy white, sometimes flushed with brown. *Specific Gravity*, 0.5269; *Percentage of Ash*, 0.33; *Relative Approximate Fuel Value*, 0.5252; *Coefficient of Elasticity*, 110973; *Modulus of Rupture*, 1019; *Resistance to Longitudinal Pressure*, 482; *Resistance to Indentation*, 181; *Weight of a Cubic Foot in Pounds*, 32.84.

Uses.—Sometimes used for interior finishing, flooring, etc. and valuable for wooden-ware, turned work, etc. It makes very good charcoal, and the bark, with copperas as a mordant, makes a purple-black dye. Maple sugar is sometimes made from the sap of this tree, but it is estimated that it requires about twice as much sap to yield a given quantity of sugar as does the sap of the Sugar Maple, though the sugar is very light color and excellent flavor.

The tree is a valuable and popular shade tree for streets of villages and cities, though not casting as dense a shade as does the Sugar Maple.

Medicinal Properties.—None are ascribed to this species.

Note.—In this species we find occasionally that interesting freak of nature in which the fibres, for some unexplainable reason, develop spirally, and the result is a waved or corrugated surface when the timber is
split on any plane — radial, tangential or intermediate. When these surfaces are planed smooth, the appearance of the corrugations still remains, the semblance to light and shadow in the smooth surface being so perfect that we almost have to feel before we can believe that the waves do not really exist.

This is the "curly figure." Maple timber which bears it is known as Curly Maple, and is very choice. It finds a ready sale, and is cut into veneering for elegant furniture, interior car and cabin decoration, etc. To represent this important figured wood we have introduced in the accompanying specimens an extra set (marked 26") of the Silver-leaved Maple, which shows the figure very perfectly. It will be noticed, on reference to that, that the figure, unlike that of the Blister and Birds-eye Maples (represented in Part I as Nos. 7" and 7"), is scarcely, if at all, noticeable in the transverse section. The figure is common to the Red and Sugar Maples, as well as the one now before us, and is occasionally found in other timbers.

It is more difficult to detect this figure in the untouched tree than is the birds-eye figure. Indeed, it rarely can be detected, unless it be very coarse, without exposing the wood, and then the surface is found to be corrugated, the corrugations running transversely around the tree and the inner surface of the bark corresponding. The size of the corrugations is quite variable, one tree having several "curls" to the inch and another, perhaps, not more than one or a part of one to the inch.

Order LEGUMINOSE: Pulse Family.

Leaves alternate, usually compound entire and furnished with stipules. Flowers with 5 sepals more or less united at the base; petals 5, papilionaceous or regular; stamens diadelphous, monodelphous or distinct and with versatile anthers; pistils single, simple and free. Fruit a legume (pod) with mostly albumenless seeds.

Genus GYMNOCCLADUS, Lam.

Leaves alternate, large, sometimes 3 ft. in length, unequally bipinnate with ovate-acuminate stalked leaflets 1-2 inches in length, standing vertically and of a dull-green color, single leaflets sometimes being in place of pinne; stipules wanting. Flowers whitish, about 1 inch in length, dioecious or polygamous and in racemes 3-6 inches in length; calyx tubular, 5-cleft; petals 5, oblong, equal and inserted on the summit of the calyx-tube; stamens 10, short, distinct and also inserted on the summit of the calyx-tube. Fruit a large, flat, oblong, curved pod 6-10 in. (15-25 cm.) in length and nearly or quite 2 in. (5 cm.) in breadth, hard and of a brownish color, pulpy inside and containing several very hard and flattish seeds over \( \frac{1}{2} \) in. (1.3 cm.) in diameter.

Trees. (Gymnocladus is from the Greek \( \gamma v u v o ' s \), naked, and \( \chi l a s o ' s \), branch, in allusion to the peculiarly bare appearance of the branches in winter.)
27. GYMNOCLADUS CANADENSIS, Lam.

Coffee-Tree.

Ger., Amerikanischer Schusserbaum; Fr., Chicot, Gros Fevier; Sp., Arbol de café falso.

Specific Characters.—Comprised in the above generic description this being the only species.

A tree of rather slim, straight habit of growth, sometimes attaining the height of 100 ft. (30 m.) with a trunk 3 ft. (0.90 m.) in diameter, conspicuous in summer from its large bicomound leaves of peculiar tint. In winter, when the leaves are off, the absence of small twigs is a striking feature, the branches having a peculiarly barren and dead appearance. From this character it has received its generic name, and for the same reason the Canadian French call it "Chicot," i. e., stump tree.

Habitat.—Western New York (rare and local), southern Ontario and westward to Minnesota, southward to Tennessee, growing in rich soil along streams.

Physical Properties.—Wood heavy, strong, coarse-grained, quite durable in contact with the soil, easily worked, handsome and taking a high polish. It is of a rich brown color, marked or blotched as it were here and there with red. The sap-wood is thin and of a greenish-white color. Specific Gravity, 0.6934; Percentage of Ash, 0.67; Relative Approximate Fuel Value, 0.6888; Coefficient of Elasticity, 104822; Modulus of Rupture, 771; Resistance to Longitudinal Pressure, 400; Resistance to Indentation, 160; Weight of a Cubic Foot in Pounds, 43.21.

Uses.—A very suitable timber for cabinet work, and it is used too to some extent for building purposes, for fence-posts, rails, etc. It is valuable as an ornamental shade tree, and is quite extensively propagated for that use. It is said that the leaves macerated and sweetened are used to some extent as a fly poison.

Medicinal Properties.—None are known of this species.

Note.—The name "Coffee-Tree" is said to have been given this tree from the use which the early inhabitants made of its seeds as a substitute for coffee, but which was discontinued when the real article could be had.

Genus GLEDITSCHIA, L.

Leaves abruptly once or twice pinnate and often the two forms on the same specimen. Flowers polygamous, greenish and inconspicuous in small spike-like racemes; calyx short with 3-5 spreading lobes; petals 3-5 inserted on the base of the calyx.
and the lower two sometimes united; stamens 3–5, occasionally more (and part of them may be abortive), distinct, opposite the sepals and inserted on the base of the calyx; style short. Fruit a flat pod containing solitary or numerous flat seeds and often a sweet pulp.

Trees furnished with branched thorns which are usually supra-axillary. (Named in compliment to John G. Gleditsch, a botanist).

28. GLEDITSCHIA TRIACANTHOS, L.

HONEY LOCUST, BLACK OR SWEET LOCUST, THREE-THORNEA ACADEMIA.

Ger., Driedorfinger Honigdorn; Fr., Fevrier a trois épinas; Sp., Algarrobo de miel.

Specific Characters.—Leaves irregularly biecompound, single leaflets being often replaced by pinnae; leaflets lanceolate-oblong, obtuse, and slightly serrate; thorns very stout, from 2–12 inches (5–30 cm.) in length and usually triple, i.e., each sending out two thorns as branches. Flowers (June) as described for the genus. Fruit a flat linear brownish-red pod about 1 in. (2.5 cm.) or somewhat more in width and often 1 ft. or more in length, twisted and contorted and containing a pulp which is sweet at first (but after a few weeks ferments and becomes very sour) and many hard, flat, brown seeds.

(The specific name, triacanthos is from the Gk. τριακάνθος, three and αὐξάνω, thorn, in allusion to the triple or three branched thorns.)

A tree sometimes 100 ft (30 m.) in height, or rarely taller, and 3 or 4 ft. (1 m.) in diameter, usually noticeable on account of the ugly branched thorns, sometimes a foot in length which bristle out along its trunk and branches in a most formidable manner (as the writer was very forcibly impressed, once in younger days, when he had occasion to ascend one of these trees after his pet owl which had escaped to its top). The foliage is so thin and light that it offers little obstruction to the sun’s rays. After the leaves have fallen the long, contorted pods swing and rattle in the wind for a long time, many until spring. The bark is blackish, hard and smooth until with age it checks and becomes detached in plates.

Habitat.—A tree naturally of the central region of the United States from Michigan nearly to the Gulf and particularly along the Mississippi and Ohio river basins, growing best in the rich bottom lands. It is extensively introduced, however, and apparently becoming naturalized in the Atlantic States.

Physical Properties.—Wood heavy, hard, strong and durable in contact with the soil. It is of a rich reddish-brown color with a yellowish-white sap wood. Specific Gravity, 0.6740; Percentage of Ash, 0.80; Relative Approximate Fuel Value, 0.6686; Coefficient of Elasticity, 108579; Modulus of Rupture, 925; Resistance to Longitudinal Pressure, 500; Resistance to Indentation, 168; Weight of a Cubic Foot in Pounds, 42.00.
29. Prunus Serotina — Wild Black Cherry.

Uses.—A valuable timber in sections where abundant for fence-posts and rails, etc., and is used to some extent for the hubs of wagon wheels, etc.

The tree is a popular one for ornamental purposes and young trees are extensively used for hedges.

Medicinal Properties.—None are known of this species.

Order Rosaceæ: Rose Family.

Leaves alternate and with stipules which sometimes fall early or are rarely wanting. Flowers regular; sepals 5 or rarely fewer, united at the base and often furnished outside with branchlets resembling the sepals; petals as many as the sepals or rarely wanting, distinct and inserted on a disk which lines the calyx-tube; stamens distinct, numerous (with rare exceptions) and inserted with the petals on the disk of the calyx-tube; pistils 1–many distinct or united and often combined with the calyx-tube. Fruit various, as drupe, pome, achenia, etc.; seeds solitary or few, mostly albumenless, with straight embryo and large thick cotyledons.

Trees, shrubs and herbs many of great economic value in the production of most useful fruits, beautiful flowers, choice perfumes, etc.

Genus Prunus, Tourn.

Leaves simple; stipules free and commonly deciduous. Flowers perfect, with calyx regular, free and falling away after flowering; petals widely spreading; stamens 15–30; pistil solitary with style terminal or nearly so and ovary containing 2 pellulous ovules. Fruit a drupe, fleshy with a smooth 4-seeded (rarely 2-seeded) stone.

Trees, and shrubs. ("Prunus" is the ancient Latin name of the plum-tree.)

29. Prunus Serotina, Ehrh.

Wild Black Cherry.

Ger., Spätblühende Traubenkirsche; Fr., Mérisier; Sp., cereza silvestre negra.

Specific Characters.—Leaves deciduous, 3–5 inches long and half as broad, rather thick and shining above, lanceolate-oblong or elliptical, unequally serrate with short callous teeth and the petioles bearing 2–4 reddish glands. Flowers (June) appear after the leaves in elongated spreading cylindrical racemes; petals white, obovate. Fruit (cherry) somewhat larger than a pea, purplish-black and when ripe of pleasant flavor.

(The specific name "serotina" is the Latin for late, doubtless in allusion to the lateness of the appearance of the flowers as compared with some others of the genus.)

This tree sometimes attains the height of 100 ft. (30 m.) with a tall straight trunk 3 or 4 ft. (1 m.) in diameter undivided for some ways from the ground. Its bark when young is smooth and close, the outer layer peeling off in strips transversely, but as the bark grows older breaking into small hard scales of dark color and giving the old trunks a very characteristic appearance. When in blossom the showy cylindrical clusters of white flowers are a prominent feature.

Habitat.—Southern Canada and eastern United States generally, though of small growth in the extreme south; said to attain its greatest development along the Alleghany Mountains.
PHYSICAL PROPERTIES. — Wood hard, strong, rather light, close-grained, easily worked and susceptible of a fine polish. It is of a light reddish-brown color when fresh, but darkens with age to a dull red; sap-wood light yellowish. Specific Gravity, 0.5822; Percentage of Ash, 0.15, Relative Approximate Fuel Value, 0.5813; Coefficient of Elasticity, 85833; Modulus of Rupture, 829; Resistance to Longitudinal Pressure, 547; Resistance to Indentation, 204; Weight of a Cubic Foot in Pounds, 36.28.

USES.—One of the most valuable and popular of our native woods for interior finishing, furniture, etc. The fruit is sometimes used in a domestic way for making a kind of brandy known as "cherry brandy."

MEDICINAL PROPERTIES are found in the bark and are readily yielded to cold water — though owing to volatilization and chemical change boiling water must not be used. They are of a tonic and sedative nature and efficacious in cases of debility of the stomach or of the system in general, phthisis, bronchitis,* etc.

We have seen in domestic use an infusion of the fresh bark with cider and this is certainly very wholesome and invigorating for a weak stomach.

NOTE.—Tracts of cherry forest, at the season when the cherries are ripe, are great places of rendezvous for the frugivorous birds, and thither, too, the black bear is sure to find its way and fattens largely on the luscious fruit.

GENUS PYRUS,† L.

Leaves simple or pinnate; stipules free. Flowers white or rose-colored in cor-ymbed cymes; calyx-tube urn-shaped, becoming thick and fleshy in the fruit, limb 5-cleft; petals 5, obovate or roundish; stamens numerous; styles 5 (or sometimes 2-3), and carpels (of the same number) 2-seeded, with papery or cartilaginous endocarp and united with the calyx-tube. Fruit a closed pome, fleshy or berry-like. Trees or shrubs. ("Pyrus" is the ancient Latin name of the pear-tree.)

30. PYRUS MALUS, L.

APPLE.

Ger., Apfelbaum; Fr., Pommier; Sp., Manzana.

SPECIFIC CHARACTERS.—Leaves simple, 2–3 inches in length, ovate or ovate-ob-long, downy and veins incurved. Flowers expanding with the leaves, in unbellate cymes, white or rose-color, handsome and delicately fragrant; pedicels and calyx when young downy-tomentose; petals with short claws; styles united below. Fruit globose, sunken at the place of attachment of the stem and at the opposite extremity. ("Malus" is the ancient Latin name of the apple-tree.)

A tree not often over 30 ft. (9 m.) in height, excepting in thickets or with a trunk more than 2½ ft. (0.76 m.) in diameter, but with full, wide-spreading top.

† Sometimes written Pirus.
Habitat.—Europe is the native country of the apple, but from thence it has been extensively introduced into all countries of temperate climate, and now seems to be quite naturalized in the United States, self-seeding very commonly.

Physical Properties.—Wood heavy, very hard and close-grained, brittle, susceptible of a high polish and warping badly on drying. It is of a brownish color, sometimes strongly tinted with red, and the sap-wood is of a dull white.

Uses.—Apple wood is of especial value in turned work for tool-handles, buttons for plane-stocks, mallets, etc.

The valuable fruit of this tree is too well known to require comment. In economic importance it is probably second to no other fruit.

Medicinal Properties are not ascribed to this species.

Order Oleaceae: Olive Family.

Leaves opposite and single or pinnately compound. Flowers monopetalous (rarely apetalous or polygamous); calyx 4-cleft, toothed or entire, or sometimes wanting; corolla regular, 4-cleft (or sometimes 4-petalous, or even wanting altogether); stamens only 2 (or rarely 4); ovary 2-celled with usually 2 suspended ovules in each cell. Fruit fleshy or capsular, containing 4 (or fewer) seeds.

Represented by trees and shrubs.

Genus Fraxinus, Tourn.

Leaves petioled, oddly-pinnate, with 3–15 toothed or entire leaflets. Flowers small, racemous or panicled, from the axils of the last year's leaves, the American representatives dioecious and apetalous; calyx and corolla, when present, as described for the order; anthers large, linear or oblong; style single, stigma 2-cleft. Fruit a 1–2-celled, flattened samara, winged at the apex, 1–2 pendulous seeds in each cell.

("Fraxinus" is the ancient Latin name of the Ash; supposed to be from the Greek φράξις, a separation, alluding to the facility with which the wood splits.)

31. Fraxinus pubescens, Lam.

Red Ash, Gray Ash.

Ger., Rothesche; Fr., Frêne rouge; Sp., Fresno colorado.

Specific Characters.—Leaves with 7–9 ovate or elliptic-lanceolate, taper-pointed, stalked leaflets 2–3 inches in length, only slightly serrate and pale beneath; petioles and terete branchlets for the first season velvety pubescent. Flowers with calyx present and persistent in the fruit. Fruit (samara) 1 1/2–2 inches in length, with narrow lanceolate or oblanceolate obtuse wing, the edges of which are decremental somewhat upon the calycule and nearly terete base.

("Pubescens" is the Latin for pubescent in allusion to the downy covering of the new twigs and petioles.)

A tree sometimes 50 ft. (15 m.) or more in height and 2 ft. (0.60 m.) in diameter of trunk with grayish, scaly bark, closely resembling the Black Ash, but with foliage and fruit resembling the White Ash.

Habitat.—Southern Canada and eastern United States south to the Gulf States, but reaching its greatest development in the north. It is
found in company with the Black Ash along streams and in swamps subject to inundation.

Physical Properties.—Wood moderately heavy and hard, strong, coarse-grained and compact; of a rich reddish-brown color and thin yellowish-white sap-wood. Specific Gravity, 0.6251; Percentage of Ash, 0.26; Relative Approximate Fuel Value, 0.6235; Coefficient of Elasticity, 81222; Modulus of Rupture, 869; Resistance to Longitudinal Pressure, 435; Resistance to Indentation, 204; Weight of a Cubic Foot in Pounds, 38.96.

Uses.—This wood is used to some extent in the manufacture of agricultural implements, and (as with the Black Ash) for interior finishing, furniture, etc., and in rural districts for fence rails.

Medicinal Properties.—None are known of this species.

Order Lauraceae: Laurel Family.

Leaves alternate, simple, generally marked with pelucid dots and (as with the bark) aromatic. Flowers in clusters; sepals 4-6; colored, slightly united at the base, strongly imbricated in 2 rows in the bud; stamens definite with 2-4 celled anthers which open by recurved lid-like valves; pistil solitary, free, 1-celled, 1-ovuled and with single style. Fruit a drupe or berry with single suspended anatropous albumenless seed. Trees and shrubs.

Genus Sassafras, Nees.

Leaves deciduous and in fall turning to a buff or handsome yellow color, these and the twigs very mucilaginous. Flowers dioecious, greenish-yellow, appearing before the leaves in terminal corymbose racemes and furnished with linear bracts; calyx 6-parted with spreading and equal lobes, deciduous. Sterile flowers with 9 stamens at the base of the calyx in three rows, the inner row furnished with a pair of stalked glands at the base of each; anthers 4-celled; ovary abortive. Fertile flower with 6 rudimentary and imperfect stamens; pistil with an ovoid acuminate ovary, short styles and capitate stigma. Fruit an ovoid drupe blue and on a short, fleshy, reddish pedicel.

Trees. ("Sassafras" is from "salsafras," the Spanish for "saxifrage," the properties of which have been attributed to this.)

32. Sassafras officinale, Nees.

Sassafras.


Specific Characters.—Leaves glabrous (excepting when young) and of various shapes, all more or less cuneate at the base, but some oval or ovate lanceolate and entire, others 3-lobed and still others with a single lobe on one side, giving the leaf the shape of a mitten. ("Officinale" is the Latin for "official" or "officinal.")

This tree is characterized by the soft bark of the trunk being cleft into prominent longitudinal ridges, of a brownish-gray color on the surface but within of a reddish-brown. The bark of the twigs and young shoots is of a delicate green. Every part of the tree possesses a pleasant aromatic flavor and fragrance, but this is most conspicuous in the bark and
particularly that of the roots. When growing in tall forests one is impressed with the peculiarly crooked and almost vine-like appearance of the trunks. In favorable localities this tree attains the height of 50 ft. (15 m.) with a trunk 3 ft. (0.90 m.) in diameter.*

HABITAT.—Eastern United States north to about the latitude of central New York, westward to Kansas and southward to the Gulf, reaching its greatest development in the southern and south-western part of its range. In the north it is usually a mere shrub, the trees being rare and local.

PHYSICAL PROPERTIES.—Wood light, soft, rather brittle, coarse-grained and of a delicate brown color, the sap-wood, which occupies but a few rings, being of a yellowish white. It partakes slightly of the aromatic nature of the bark, and lasts well in contact with the soil. Specific Gravity, 0.5042; Percentage of Ash, 0.10; Relative Approximate Fuel Value, 0.5037; Coefficient of Elasticity, 51910; Modulus of Rupture, 602; Resistance to Longitudinal Pressure, 382; Resistance to Indentation, 134; Weight of a Cubic Foot in Pounds, 31.42.

USES.—The timber is used to some extent in the manufacture of pails, buckets, ox-yokes, etc., for which its lightness makes it suitable, but it is more extensively used for fence-rails, posts, etc., where it is of value owing to its enduring long exposure to the weather. The odor of the Sassafras, which is slightly noticeable in the timber, is said to be obnoxious to insects, and for that reason boxes, chests, etc., made of this wood are to a certain extent insect-proof.

A flavoring extract, due to an essential oil which is distilled from the bark of the roots, is of great value and popularity. In this oil, too, as well as a mucilage derived from the pith of the young shoots, lies a medicinal virtue, on account of which the Sassafras was one of the first trees of America to become known to the Europeans, it being scarcely more than half a century after the landing of Columbus when this was published to the world by the Spanish writer, Monardes.†

The mucilaginous leaves of the Sassafras dried and pounded are used in the South in the preparation of "gumbo" soup, and a decoction of the bark is said to make a durable orange-color dye for woolen goods.

MEDICINAL PROPERTIES are found in the pith of the young shoots, which, treated with water, yield a peculiar mucilage, and in the bark, especially of the roots, from which a volatile oil is extracted.

The mucilage is much employed as a soothing application in inflammation of the eyes, and forms an agreeable and useful drink in dysenteric.

* Prof. C. S. Sargent reports this tree as exceptionally attaining a very much larger size—even 90 ft. (27 m.) in height and 7 ft. 6 in. (2.25 m.) in diameter of trunk, which dimensions must be very rare.
† We might add, however, that some of the properties ascribed to the Sassafras in those early days are not claimed of it now.
catarrhal and nephritic diseases. It may be prepared by adding a drachm of the pith to a pint of boiling water. Owing to its volatile oil and tonic acid, the bark of the Sassafras root is an aromatic stimulant and astringent. It is used almost exclusively as an adjuvant to other more efficient medicines, the flavor of which it improves, while it renders them more cordial to the stomach. The volatile oil may be used as an aromatic. In overdose it is capable of producing marked narcotic poisoning.*

ORDER ULMACEAE:† Elm Family.

*Z7.

Leaves simple, alternate; stipules caducous. Flowers perfect or polygamous by abortion, apetalous, in loose clusters, not catkins; calyx somewhat bell-shaped, free from the ovary; stamens springing from the calyx, usually as many as its lobes and opposite them; filaments straight, ovary 1–2-celled with a single suspended ovule in each cell; styles or stigmas two. Fruit, a samara or drupe with suspended seed; no albumen.

Represented by trees, rarely shrubs.

Genus Ulmus, L.

Leaves short petiolated usually rather rough, markedly straight-veined, unequally or obliquely heart-shaped or abrupt at the base, stipules small, caducous. Flowers appearing before the leaves in our species, purplish or yellowish, apetalous, polygamous, in lateral clusters or racemes; calyx 4–9-lobed; stamens 4–9, with long, slender filaments; ovary 2-celled, or rarely 1-celled, compressed; styles 2, short and diverging. Fruit a samara with a broad, membranous margin, 1-celled by obliteration, and 1-seeded; seed with no albumen, large cotyledons and straight embryo.

(Ulmus is the ancient Latin name of the Elm.)

33. Ulmus Americana, L.

White Elm, Water Elm, American Elm.

Ger., Weisse Ulme, Rüster; Fr., Orme parasol; Sp., Olmo blanco.

Specific Characters.—Leaves ovate-oblong, oval or obovate, sharply serrate (often doubly so), unequal at the base and rather abruptly narrowing at the apex to a tapering point; smooth above and soft-pubescent or glabrous beneath and 2–4 inches in length; branchlets glabrous; branches without corky ridges. Flowers (April) in umbellate clusters with slender pedicels, jointed above the middle; calyx-lobes 7–9, roundish; stamens 7–9, exserted; anthers purple. Fruit (May and June) about \( \frac{1}{4} \) inch long, oval or ovate, smooth, but with densely ciliate margin, and the incurved sharp points at the apex meeting and closing the notch.

A magnificent tree of very characteristic and beautiful form. It towers sometimes to the height of 100 ft. (30 m.) or more, with a trunk 6 or 7 ft. (2 m.) in diameter, and with a magnificent wide-spreading top and long, pendulous branches. In graceful beauty and symmetry of form this tree is certainly not surpassed by any tree in America, and Micheaux, who studied the trees of this country, now nearly a century ago, pronounced it "the most magnificent vegetable of the temperate zone." The bark of the White Elm is of a light-gray color and rough, with longitudinal and not very closely adherent ridges.

† Ranked by some authors as a sub order of the order Urticaeae.
Habitat.—A tree of extensive range, being found in suitable localities from New Foundlan and Nova Scotia to the Rocky Mountains and southward to Georgia and Florida, preferring the rich, humid bottom lands along the courses of streams. It reaches its perfection in the latitude of New England and northern New York, where it characterizes almost every landscape.

Physical Properties.—Wood heavy, strong, tough, compact and usually very difficult to split owing to an interlacing, as it were, of the fibers. The heart-wood is of a light brown color and the sap-wood yellowish-white. Specific Gravity, 0.6506; Percentage of Ash, 0.80; Relative Approximate Fuel Value, 0.6454; Coefficient of Elasticity, 74742; Modulus of Rupture, 852; Resistance to Longitudinal Pressure, 446; Resistance to Indentation, 170; Weight of a Cubic Foot in Pounds, 40.55.

Uses.—A valuable timber in the manufacture of agriculture implements, tool handles, wagon-wheels, especially the hubs, in cooperage and in ship-building.

Though not casting a very dense shade elms of this species are of first importance as ornamental trees.

Medicinal Properties are not claimed of this species.

34. Ulmus Racemosa, Thomas.

Cork Elm, Rock Elm, Cliff Elm, White Elm.

Ger., Trauben Ulme; Fr., Orme à grappe; Sp., Olmo de corcho.

Specific Characters.—Leaves ovate, oblong or obovate, sharply and doubly serrate, unequal at base, taper-pointed, smooth above, minutely pubescent beneath; bud-scales minutely pubescent and ciliate; young branchlets somewhat pubescent; branches usually with thick corky ridges or wings. Flowers (April) in racemes with slender pedicels jointed above the middle; calyx 7–8-cleft; stamens 7–10. Fruit (May, June), ovate-elliptical samaræ, about ½ in. (2 cm.) long, pubescent and with ciliate margin.

(“Racemosa” is a Latin word descriptive of the form of flower cluster—a raceme.)

Trees of striking aspect owing to the thick corky projections or wings along its branches, commencing with about the third or fourth year’s growth. The bark of the trunk is thick, of a grayish color and rough with firm longitudinal ridges. It sometimes attains 80 ft. (24 m.) or more in height and 3 ft. (0.90 m.) in diameter of trunk.

Habitat.—Western New England, Ontario and westward to Iowa, southward into Kentucky, growing along hill-sides and river banks.

Physical Properties.—Wood heavy, hard, compact, exceedingly tough and strong, and usually very difficult to split, owing to its contorted and, as it were, interlaced fibers. The heart-wood is of a light-
brown color, and the sap-wood yellowish or greenish white. Specific Gravity, 0.7263; Percentage of Ash, 0.60; Relative Approximate Fuel Value, 0.7219; Coefficient of Elasticity, 109628; Modulus of Rupture, 1066; Resistance to Longitudinal Pressure, 592; Resistance to Indentation, 205; Weight of a Cubic Foot in Pounds, 45.26.

Uses.—A very valuable timber for agricultural implements, wheel-stock, axe-helves, etc. It is particularly valuable for the hubs of wheels owing to the difficulty with which it splits, and its superiority over Hickory for axe-helves is attested by the greater price which they command in market.

Medicinal Properties.—None are claimed of this species.

Order JUGLANDACEAE: Walnut Family.

Leaves alternate, pinnate and without stipules. Flowers monoecious and apetalous, except in some cases in the fertile flowers. Sterile flowers in catkins with an irregular calyx adnate to the scale of the catkin. Fertile flowers solitary or in small clusters, with calyx regularly 3-5-lobed, adherent to the incompletely 2-4-celled, but 1-ovuled ovary. Fruit a sort of dry drupe (a tryma), with a fibrous and more or less fleshy and coriaceous outer coat (shuck) very astringent to the taste, a hard, bony inner coat (shell), and a 2-4-lobed seed, which is orthotropous, with thick, oily and often corrugated cotyledons and no albumen.

All representatives of the order are trees.

Genus JUGLANS, L.

Leaves odd-pinnate, with numerous serrate leaflets; leaf-buds few-scaled or nearly naked. Sterile flowers in long, simple, imbricated, axillary catkins from the wood of the preceding year; calyx unequally 3-6-cleft; stamens 12-40 with very short and free filaments. Fertile flowers several in a cluster or solitary at the ends of the branches; calyx 4-toothed and bearing in its sinuses 4 small petals; styles 2, very short; stigmas 2, somewhat club-shaped and fringed. Fruit drupaceous with a fibrous and spongy, somewhat fleshy, indehiscent epicarp (shuck), and a rough irregularly furrowed endocarp (shell); embryo edible and wholesome.

Trees with strong-scented resinous-aromatic bark and a pith which separates into thin transverse disks. (Juglans is contracted from Latin Jovis glans, the nut of Jove.)

35. JUGLANS NIGRA, L.

Black Walnut.

Ger., Schwarze Wallnussbaum; Fr., Noyer noir; Sp., Nogal negro.

Specific Characters.—Leaflets ovate-lanceolate, somewhat heart-shaped at the base, taper-pointed, smooth above, lower surface and petioles minutely glandular pubescent, emitting, when bruised, a characteristic aromatic odor. Flowers (April and May) as described for the genus. Fruit (October) globose, 2 inches in diameter with roughly dotted surface, odoriferous, spongy; nut globose, somewhat flattened, corrugated.

A tall and handsome forest tree with dark, deeply furrowed bark and sometimes attaining the height of 125 ft. (38 m.) and 8 ft. (2.5 m.) in diameter of trunk. When growing in the open it develops a full, round top of symmetrical outline and casting a dense shade.
HABITAT.—Central and eastern United States, north to the latitude of central New York and south nearly to the Gulf; most abundant and luxurious along the Ohio river and its tributaries.

PHYSICAL PROPERTIES.—Wood rather hard, heavy and durable, taking a beautiful polish and easily worked. It is of a violet-brown color, turning blackish with age. The sap-wood, which is thin, is of a yellowish-white, in striking contrast with the color of the heart-wood. Specific Gravity, 0.6115; Percentage of Ash, 0.79; Relative Approximate Fuel Value, 0.6067; Coefficient of Elasticity, 109200; Modulus of Rupture, 856; Resistance to Longitudinal Pressure, 583; Resistance to Indentation, 196; Weight of a Cubic Foot in Pounds, 38.11.

USES.—This is one of the most valuable of our American timbers for cabinet-making, interior-finishing, gun-stocks, etc. This use has generally supplanted its earlier use for fence-rails, posts, shingles, boat-building, etc., for which it was highly esteemed. The fruit of this tree is a valuable nut with a kernel of peculiar flavor, and though it is generally considered as delicious, many have to acquire a taste for it. It is very rich, and an oil is sometimes expressed from it which is said to be used in cookery. The kernel has also been used in making bread.

The pulpy husk surrounding the nut yields a dye which imparts to wool a substantial dark-brown color.

MEDICINAL PROPERTIES.—The leaves are supposed to possess the same properties as do those of the allied European Walnut (J. regia), which have been found in the highest degree efficacious in scrofula, an infusion or extract being taken internally, and, at the same time, a strong decoction being applied to the ulcers and used as a collyrium when the eyes are distressed. It appears to act as a moderately aromatic, bitter and astringent. They are said to have proved useful as a topical application in malignant pustule.*

NOTE.—Michaux mentions dug-out canoes made of this timber, and some of them (made from single logs, of course) as being “more than forty feet long and two or three feet wide.”

Genus Carya, Nutt.

Leaves odd-pinnate with few leaflets; leaf-buds scaly and from them appear generally both kinds of flowers, the fertile at the extremity of the growth and the sterile at the base, the leaves between. Sterile flowers in slender, imbricated, mostly forked catkins; scales 3-parted; calyx mostly 3-parted; stamens 3–10, free, filaments short or wanting and anthers hairy. Fertile flowers clustered 2–5 together, their common peduncle terminating the shoot of the season; calyx 4-cleft, superior; petals none; stigmas sessile, 2-lobed, the lobes bifid, papillose, persistent. Fruit (October) with a coriaceous but at length dry and hard epicarp (shuck), finally falling away in 4-valves, and a smoothish horny endocarp (shell) with a 2-lobed nucleus.

Trees with hard bark, very tough wood and continuous pith; pubescence stellate. ("Carya" is the ancient Greek name—Karpi̇a—of the Walnut.)
36. CARYA ALBA, Nutt.

Shell-bark Hickory, Shag-bark Hickory.

Ger., Rindenschälende Hickory; Fr., Noyer tendre; Sp., Nogal de America.

Specific Characters.—Leaves with long petioles and 5 finely serate leaflets which are sub sessile excepting the terminal one, the upper three obovate-lanceolate and the lower two very much smaller, deflexed and oblong-lanceolate, all taper-pointed and minutely downy beneath, especially when young, inner bud-scales persist for a time and become large and conspicuous. Flowers appear in April or May; sterile catkins long, pendulous and in threes with common peduncle; fertile flowers 2 or 3 together, sessile. Fruit depressed-globular, the four valves of the epicarp being thick (though quite variable in this), woody, distinct and promptly separating to the base; nut nearly white, roundish, compressed, slightly mucronate, the shell rather thin and the kernel sweet and delicious. (“Alba” is the Latin for white.)

A sturdy and beautiful tree with long slim trunk and always noticeable, when of sufficient age, from the long plates of its outer bark which bristle or hang loosely about it, giving it a decidedly shaggy appearance, and it is from this that it receives its name. It sometimes attains and rarely surpasses the height of 100 ft. (30 m.) and 3 ft. (0.90 m.) in thickness of trunk.

Habitat.—Eastern United States generally, west to beyond the Mississippi river and south nearly to the Gulf coast; said to thrive best west of the Alleghany Mountains.

Physical Properties.—Wood very heavy, tough, strong and flexible; the heart-wood is of a light-brown color and the sap-wood creamy-white. Specific Gravity, 0.8372; Percentage of Ash, 0.73; Relative Approximate Fuel Value, 0.8311; Coefficient of Elasticity, 138839; Modulus of Rupture, 1200; Resistance to Longitudinal Pressure, 625; Resistance to Indentation, 271; Weight of a Cubic Foot in Pounds, 52.17.

Uses.—A very valuable wood for agricultural implements, the wheels and runners of vehicles, axe-helves, baskets, etc., and its nuts are an important article of commerce, most of the hickory nuts of the market being produced by this species.

Medicinal Properties.—The leaves of most, if not all, of the hickories are somewhat aromatic and astringent, and the bark astringent and bitter. Great advantage has been found from chewing the inner bark in dyspepsia, and a tincture has been used with great success in the treatment of intermittent fever.*

37. CARYA AMARA, Nutt.

Bitter-nut Hickory, Swamp Hickory.

Ger., Bitterfrüchtige Hickory; Fr., Noyer amer; Sp., Nogal amargo.

Specific Characters.—Leaflets 7-11, sessile (excepting the odd terminal one, which is subsessile), ovate or oblong-lanceolate, taper-pointed, serrate, smooth both sides, though pubescent, as with the catkins, when young; bud-scales, about 6, orange-yellow, valvate and falling away early. Fruit subglobose with thin epicarp, sutures prominent above, valves united below; nut subglobose or somewhat obcordate, white, smoothish, and shell so thin that it can be broken with the fingers; kernel intensely bitter.

("Amara" is the Latin for bitter.)

A graceful tree resembling the Ash somewhat in its fine-cut foliage, and a conspicuous feature at all seasons is its orange-yellow buds. The bark is of a gray color, with a faint yellowish tinge, and is cleft longitudinally, but the outer layer adheres closely—i.e., does not become shaggy as in the Shag-bark Hickory. It sometimes attains 80 ft. (24 m.) in height and 3 ft. (0.90 m.) in diameter of trunk.

Habitat.—Eastern United States, generally preferring swamps and moist flat-lands, though not wholly confined to such localities.

Physical Properties.—Wood heavy, hard, strong and flexible, of a brownish color, with light sap-wood, liable to check in seasoning. Specific Gravity, 0.7552; Percentage of Ash, 1.03; Relative Approximate Fuel Value, 0.7474; Coefficient of Elasticity, 102986; Modulus of Rupture, 1101; Resistance to Longitudinal Pressure, 522; Resistance to Indentation, 242; Weight of a Cubic Foot in Pounds, 47.06.

Uses.—The timber is inferior to that of the Shag-bark, but, like it, used in the manufacture of agricultural implements, tool-handles, etc., and for hoops, ox-yokes, etc. The nuts are practically useless—too bitter for even squirrels to eat when other food can be found. In early days it is said that an oil expressed from the kernel was used to some slight extent for illuminating purposes.

Medicinal Properties.—For mention of these, in common with those of the other Hickories, see (under Shell-bark H.) page 26.

Order CUPULIFERÆ: Oak Family.

Leaves alternate, simple, straight-veined; the stipules, forming the bud-scales, deciduous. Flowers monocious, apetalous. Sterile flowers in clustered or racemose catkins (or in simple clusters in the Beech); calyx regular or scale-like; stamens 5-20. Fertile flowers solitary, clustered or spliced, and furnished with an involucre which forms a cup or covering to the nut; calyx-tube adherent to the ovary, its teeth minute and crowning the summit; ovary 2-7-celled with 1-2 pendulous ovules in each cell, but all of the cells and ovules, except one, disappearing before maturity; stigmas sessile. Fruit a 1-celled, 1-seeded nut, solitary or several together, and partly or wholly covered by the scaly (in some cases echinate) involucral cup or covering; seed albumenless, with an anatropous, often edible, embryo; cotyledons thick and fleshy. Represented by both trees and shrubs.
HOUGH'S American Woods.

Genus Quercus, L.

Flowers greenish or yellowish. Sterile flowers in loose, slender, naked catkins, which spring singly or several together from axillary buds; calyx 2-8-parted or cleft; stamens 3-12; anthers 2-celled. Fertile flowers with ovary nearly 3-celled and 6-ovuled, 2 of the cells and 5 of the ovules being abortive; stigma 3-lobed; involucre developing into a hard, scaly cup around the base of the nut or acorn, which is 1-celled, 1-seeded.

(The ancient Latin name for the Oak supposed to be from the Celtic quer, fine, and cues, tree.

38. Quercus Alba, L.

White Oak.

Ger. Weiszeiche; Fr., Chêne blanc; Sp., Roble blanco.

Specific Characters.—Leaves short petioled, oblong or obovate in outline, cuneate at base, obliquely sinuate-pinnatifid with oblong or linear obtuse and usually entire lobes, smooth (excepting when young) and coriaceous, bright green above, paler beneath. Fruit (October) an edible acorn, maturing the first year (hence borne on the shoot of the season), ⅔ to 1 inch in length, ovoid or oblong, not more than a third immersed in somewhat hemispherical or saucer-shaped cup, which is rough with little tubercles.

A noble and picturesque tree, the very embodiment of strength and sturdiness. It attains the height of 100 ft. (30 m.), with a trunk 6 ft. (1.80 m.) in diameter, and, in very favorable localities, even surpasses these dimensions. Its bark is rough with longitudinal fissures, and of a whitish-gray color—whence the name, White Oak. It is also noticeable in winter from its peculiarity of retaining until nearly spring many of the dead and withered leaves of the preceding summer.

Habitat.—Eastern United States generally, reaching its greatest development west of the Alleghanies.

Physical Properties.—Wood very strong, heavy, hard, tough and durable. It is of a brownish color with lighter sap-wood. Specific Gravity, 0.7470; Percentage of Ash, 0.41; Relative Approximate Fuel Value, 0.7439; Coefficient of Elasticity, 97089; Modulus of Rupture, 905; Resistance to Longitudinal Pressure, 511; Resistance to Indentation, 213; Weight of a Cubic Foot in Pounds, 46.35.

Uses.—This is one of the most generally useful of American timbers where a hard wood is required. It is very valuable in ship-building, for sills, etc., for casks, buckets and in general cooperage, for agricultural implements, etc. It is deservedly very popular for furniture, interior finishing, etc., where a beautiful effect is produced by "quartering" the timber. The bark is sometimes used for tanning.

Medicinal Properties.—Oak bark is astringent and somewhat tonic, but it is not employed as an internal remedy. The decoction may be advantageously used as a bath, particularly for children when a combined tonic and astringent effect is desirable, and the stomach is not
disposed to receive medicines kindly. It has been employed in this way in marasmus, serofula, intermittent fevers, chronic diarrhoea and cholera infantum. As an injection in leucorrhoea and as a gargle in slight inflammation of the fauces the decoction is often useful.*

39. QUERCUS MACROCARPA, Michx.

Burr Oak, Mossy-cup Oak, Over-cup Oak.

Ger., Grossfrüchtige Eiche; Fr., Chêne à gros gland; Sp., Roble con bellotas musgosas.

**Specific Characters.** — Leaves large (sometimes 12 inches long or more) obovate or oblong in outline, pale beneath, lirrate, sinuate-lobed, the sinuses being deepest near the middle and the lobes obtuse and irregular or repand. Fruit a large acorn sessile on the new growth of the season, globular-ovoid and sometimes nearly covered by the deep cup which is composed of thick, hard scales distinctly imbricated, the upper ones awned or filiform-pointed so as to make a more or less conspicuously fringed or mossy margin.

(*"Macaropa" is from the Greek μακρός, large, and προς, fruit.)

A beautiful tree with rough (from longitudinal fissures), light gray bark, but especially conspicuous on account of its large leaves and acorns. It attains the height of 100 ft. (30 m.) or sometimes more, with a trunk 6 or 7 ft. (2 m.) in diameter.

**Habitat.** — Canada, north-eastern United States and south-westward, west to the the Rocky Mountains. Prof. Sargent notes that it is "in the prairie region the principal growth of the 'oak openings' and extending farther west and north-west than any oak of the Atlantic forests."†

**Physical Properties.** — Wood heavy, hard, strong, compact and very durable in contact with the soil. The heart-wood is of a rich brown color and sap-wood lighter. Specific Gravity, 0.7453; Percentage of Ash, 0.71; Relative Approximate Fuel Value, 0.7400; Coefficient of Elasticity, 92929; Modulus of Rupture, 982; Resistance of Longitudinal Pressure, 491; Resistance to Indentation, 233; Weight of a Cubic Foot in Pounds, 46.45.

**Uses.** — This is a timber of great value in ship-building, cooperage, for furniture, etc.; in fine for all the uses in which that of the White Oak is employed and which it equals or even surpasses in value. For fuel it is very useful and its handsome luxuriant foliage gives it a high rank as an ornamental tree.

**Medicinal Properties.** — None are officially recognized of this species.

† Tenth Census of the United States, 1880, vol. ix, p. 140.
Genus CASTANEA, Tourn.

Leaves alternate, strongly straight-veined, acuminate and expanding before the flowers. Sterile flowers clustered in long naked cylindric axillary catkins; calyx 5–6 parted; stamens 5–20 with slender filaments and 2-celled anthers. Fertile flowers usually three together inclosed in an ovoid, 4-lobed, scaly involucral cup; calyx 5–6 lobed, adherent to the 3–7-celled, 6–14-ovuled ovary; stigmasawn-shaped and as many as the cells; abortive stamens 5–12. Fruit a globose, hard, very prickly, 4-valved dehiscent involucre, inclosing each, 1–3 coriaceous 1-seeded nuts; cotyledons very thick.

Trees and shrubs. ("Castanea" is the ancient Greek name of the chestnut.)

40. CASTANEA VESCA, Var. AMERICANA, Michx.

Chestnut.

Ger., Kastanie; Fr., Chêtaignier; Sp., Castaña.

Specific Characters.—Leaves oblong-lanceolate, pointed, coarsely serrate, the mucronate teeth projecting with the straight veinlets; smooth and green both sides when mature, 6–9 inches in length. Flowers appear in June or July, the long yellow catkins quite equaling the leaves in length. Fruit (October) a spiny involucral burr containing usually 2–3 ovoid nuts variously compressed according to the number in each burr, and smooth excepting near the extremity where it is villous.

A lofty tree with firm longitudinally furrowed gray bark. It is sometimes nearly or quite 100 ft. (30 m.) in height and with trunk sometimes 10 ft. (3 m.) in diameter.

Habitat.—Eastern United States, north to about the latitude of central New York; south about to the Gulf States and west to the Mississippi River, said to reach its greatest development on the western slopes of the southern Alleghanies.

Physical Properties.—Wood light, soft, very coarse-grained, durable in contact with the soil, not very strong and liable to warp in drying. The heart-wood is of a brownish color and the thin sap-wood lighter. Specific Gravity, 0.4504; Percentage of Ash, 0.18; Relative Approximate Fuel Value, 0.4496; Coefficient of Elasticity, 85621; Modulus of Rupture, 696; Resistance to Longitudinal Pressure, 381; Resistance to Indentation, 106; Weight of a Cubic Foot in Pounds, 28.07.

Uses.—The timber is largely used for interior finishing, cabinet-work, etc., and its great durability renders it especially serviceable for fence-posts, rails, etc.*

It is a valuable wood for charcoal and the bark which is rich in tannin is valuable for the tanner and may be used as a dye. The sweet and delicious nuts of this tree are too well known to require comment.

Medicinal Properties.—The leaves have been found to possess some remedial value in the treatment of whooping-cough. They yield their

*We have recently received from Haydn Brown, Esq., of West Newbury, Mass., a piece of a fence rail of this timber which he says was exposed to the weather one hundred years, as he has good reason to believe.
virtues freely to water and may be administered in infusion or fluid extract. An infusion, prepared with three or four drachms of the leaves and a pint of boiling water and well sweetened has been administered to a child—as much as it would drink.*

Note.—The American variety of the chestnut differs from the Spanish chestnut of Europe—the true *C. vesca*, L.—in having leaves more acute at base and nuts much smaller and sweeter.

The chestnut tree in Europe attains a prodigious size and age. One exists on the side of Mount Etna famous as *Castagno di cento cavalli*, because it is said to have sheltered a hundred mounted cavaliers. It is scarcely more than a shell now, but is said (on the authority of Michaux) to measure 160 ft. in circumference. At Sancerre, France, is a tree which Michaux tells us "at six feet from the ground is thirty feet in circumference; 600 years ago it was called the *Great Chestnut*, and, though it is supposed to be more than one thousand years old, its trunk is still perfectly sound and its branches are annually laden with fruit."

The fruit in that country is a favorite and valuable article of food.

**Genus Ostrya, Micheli.**

*Leaves ovate or oblong with straight veins.* Flowers appear in early spring with the leaves. *Sterile flowers* in cylindrical, drooping catkins from buds near the tip of the branches of the preceding year; calyx a mere bract, roundish-ovate, ciliate and bearing in its axil several stamens with short and sometimes forked filaments; anthers 1-celled and conspicuously hairy-tipped. *Fertile flowers* in short, imbricated, bractiate catkins terminating the shoots of the season, bract deciduous and bearing in its axil a pair of pistils, each adherent to a calyx-scale and surrounded with a tubular or sac-like bractlet, which later completely envelopes it; ovary incompletely 2-celled and 2-ovuled; stigmas 2 filiform. *Fruit* a pendent strobile, very much resembling a hop, made up of the imbricated, enlarged and closed involucral sacs, each of which contains a single, smooth nutlet.

Small trees. ("Ostrya" is the ancient Greek name.)

**41. Ostrya Virginica—Hop-Hornbeam.**

**Hop-Hornbeam, Iron-wood, Lever-wood.**

Ger., *Amerikanische Hopfenbuche*; Fr., *Bois dur*; Sp., *Ojaranzo de lupulo.*

**Specific Characters.**—*Leaves* ovate-oblong, acuminate, sharply doubly serrate, with 11–15 principal veins, smooth above, under-surface and petioles somewhat downy; leaf-buds slender and acute. *Fruit* (fully grown by August) as described for the genus, involucral sacs downy, furnished at the base with rigid hairs.

A rather small tree with fine spray, developing a full, round top when growing alone, and often with twisted trunks. Its hop-like fruit, which develops early and remains on until late, characterizes it during the sum-

Genus CARPINUS, L.

Leaves ovate, straight-veined and serrate. Sterile flowers in loose, drooping cylindrical catkins; calyx a mere ovate scale or bract, each subtending 8-14 stamens, with very short, mostly 2-forked filaments and 1-celled, slightly hairy tipped anthers. Fertile flowers in loose, terminal catkins, each pair subtended by a small, deciduous bract, and each flower furnished with a persistent involucral bractlet, which remains open, enlarges and becomes foliaceous in fruiting. Fruit an ovoid, furrowed, 1-seeded nutlet subtended by the foliaceous bractlet.

Small trees or shrubs. ("Carpinus" is the ancient Latin name of the Hornbeam.)

42. CARPINUS CAROLINEANA, Walt.


Ger., Hainbuche; Fr., Charme; Sp., Ojaranzo.

Specific Characters.—Leaves ovate or elliptical, pointed, sharp and unequally serrate, about 3 inches long and half as wide, nearly smooth when mature; leaf-buds slender, acute. Flowers appear in early spring with the leaves, as described for the genus. Fruit a small, dark-brown, 1-seeded, furrowed nutlet subtended by the involucral bractlet, which is halberd-shaped, oblique, 3-lobed and cut-toothed on one side.

A small tree, or often a mere shrub, preferring the borders of streams and swamps, and always recognizable from its smooth, bluish bark — very much like that of the Beech — and its peculiar sinewy, corrugated or ridged trunk. In summer the terminal light green fruiting catkins, in contrast with the darker green of the foliage, are a conspicuous feature. When growing alone it develops a wide, full top.

In very exceptional cases it attains the height of 50 ft. (15 m.) and 2 ft. (0.60 m.), or slightly more, in thickness of trunk.

Habitat.—Canada, north-eastern United States and southward along the Alleghanies, westward to Kansas and Indian Territory.

Physical Properties.—Wood heavy, hard, durable, very strong and tough (as its name implies), of a dull brownish color with whitish sapwood. Specific Gravity, 0.8284; Percentage of Ash, 0.50; Relative Approximate Fuel Value, 0.8243; Coefficient of Elasticity, 137.276; Modulus of Rupture, 1134; Resistance to Longitudinal Pressure, 542; Resistance to Indentation, 231; Weight of a Cubic Foot in Pounds, 51.63.

Uses.—A valuable timber for axe-helves, tool-handles, levers, fence posts, etc., but not generally found of sufficient size to make it a very important timber of commerce. It is an excellent wood for fuel.

Medicinal Properties.—None are attributed to this species.
Habitat.—Canada and eastern United States generally, said to attain its greatest size along the western slopes of the southern Alleghany Mountains and thence westward.

Physical Properties.—Wood very hard, strong, tough, close-grained and heavy, nearly white. Specific Gravity, 0.7286; Percentage of Ash, 0.83; Relative Approximate Fuel Value, 0.7326; Coefficient of Elasticity, 11481; Modulus of Rupture, 1149; Resistance to Longitudinal Pressure, 498; Resistance to Indentation, 213; Weight of a Cubic Foot in Pounds, 45.41.

Uses.—This timber is used to some extent for beetles, tool-handles, levers, etc., for which its strength and hardness admirably qualify it. It is used also for making hoops.

Medicinal Properties.—None are known of this species.

Order Betulaceae: Birch Family.

Leaves simple, alternate, straight-veined and furnished with stipules which fall away early. Flowers mostly naked, monoecious, both kinds in catkins, 2 or 3 together under a 3-lobed bract or scale. Sterile flowers with distinct stamens and 2-celled anthers. Fertile flowers with two thread-like stigmas, and a 2-celled ovary, each cell containing 2 peduncled ovules, becoming by abortion in Fruit, a small, 1-celled, 1-seeded nutlet, often with membranous wings; seed anatropous, albumenless, with flattish, oblong cotyledons which become folicaceous in germination.

Trees or shrubs, with bark which separates more or less easily into thin layers.

Genus Betula, Tourn.

Leaves ovate, serrate; these, with the twigs, especially the latter, spicy-aromatic. Flowers appearing in early spring with or before the leaves. Sterile flowers in long, drooping, cylindrical, both terminal and lateral, yellow catkins, appearing in summer and remaining dormant during the following winter to open and perform their function early the next season; bracts 3-lobed, shield-shaped, and beneath each are 2 bractlets and 3 flowers with calyx represented by a mere scale, which bears the 4 short stamens, each with a single-celled anther. Fertile flowers in cylindrical or oblong catkins with 3-lobed scales, and beneath each scale are 2–3 naked pistils without bracles or calyx. Fruit a small, broadly-winged, scale-like nutlet or samara.

Trees and shrubs with outer bark horizontally fibrous and usually separable in sheets, that of the branchlets dotted, inner bark more or less aromatic and of pleasant flavor.

43. Betula Papyracea, Ait.

Canoe Birch, Paper Birch, White Birch.

Ger., Papier-Birke; Fr., Bouleau à Canot; Sp., Abedul.

Specific Characters.—Leaves of rather firm texture, ovate, with heart-shaped or abrupt base, somewhat doubly serrate, smooth dark green above, beneath pale, glandular dotted and hairy along the veins; petiole not often over ¼ or ½ the length of the leaf-blade. Sterile catkins 1–2 inches long. Fertile catkins (mature in July or August) pedunculate, pendulous or nodding, cylindrical, 1 in. or more in length and about ⅓ as thick, with glabrous scales having short roundish lateral lobes; wing of nutlet much broader than its body.

("Papyracea" is the Latin equivalent of papery.)
A tree of medium size and rapid growth, sometimes attaining the height of 80 ft. (24 m.) and 3 ft. (0.90 m.) in diameter of the trunk. It is recognizable at all seasons from its beautiful snowy white bark which peels off transversely in large sheets, and which in turn may be subdivided into an indefinite number of thinner sheets. The outer surface of the bark of very old trunks is rendered rough and ragged by the curling up of strips of the outermost layers. On twigs and small branches the bark is of a dark brown color.

HABITAT.—A distinctively northern tree. It is found from about the latitude of Pennsylvania northward to Hudson’s Bay and in the northwest to the arctic regions. Professor Sargent observes that it reaches a higher latitude than any deciduous tree of the American forests.

Physical Properties.—Wood light, strong, tough and hard; heartwood of a reddish-brown color and sap-wood yellowish-white. Specific Gravity, 0.5955; Percentage of Ash, 0.25; Relative Approximate Fuel Value, 0.5940; Coefficient of Elasticity, 130557; Modulus of Rupture, 1065; Resistance to Longitudinal Pressure, 487; Resistance to Indentation, 126; Weight of a Cubic Foot in Pounds, 37.11.

Uses.—A favorite timber for small articles of wooden-ware, such as clothes-pins, spools, pill-boxes, shoe-lasts, pegs, etc. It is also used for wood-pulp and to some extent for furniture, especially when stained to imitate cherry or mahogany.

With the aborigines of this country this must have been the most valuable of our trees, because from its bark they were able to make their indispensable canoes, of such strength and lightness that one calculated for four persons with their baggage is said to have weighed only from forty to fifty pounds. This bark, too, was used for making their tents and for troughs, baskets, etc.

Medicinal Properties.—None are known of this species.

Note.—The bark of this tree is impervious to water and almost imperishable. Fallen trunks are sometimes found with bark in a tolerably good state of preservation, but with wood in the very last stages of decay or even reduced to mould.

The Indian, when he wished to make a birch-bark canoe, would select a large tree with as smooth bark as he could find, and then make two incisions around it, several feet apart, and connect the two with a vertical incision. Then he would carefully peel off the coveted sheet, which perhaps, would measure three or four feet in width and eight or ten in length. Another tree would yield another sheet, and these, while fresh and pliant, he would sew together with the strong, supple roots of the spruce, and deftly shape them into a beautiful craft. The seams he would smear with pine pitch or resin from the Balm-of-Gilead, and the wales he would reinforce with saplings securely lashed on. A short time
is required for the bark to dry and harden, and then he is prepared to launch out in a craft of combined speed and steadiness, and so light that he can carry it for miles on his shoulders with comfort.

44. BETULA LENTA, L.

Sweet Birch, Cherry Birch, Black or Mahogany Birch.

Ger., Kirsche-Birke; Fr., Bouleau doux; Sp., Abedul dulce.

Specific Characters.—Leaves thinnish, ovate or oblong, taper-pointed, more or less heart-shaped at base, finely and sharply doubly serrate, smooth (when mature) and bright green above, below glabrous, except along the veins, which, with the petioles, are hairy. Sterile catkins 2-4 in. long. Fertile catkins pedunculate, erect or slightly reclining, oval-oblong, 1 in. or more in length, and at least ¼ in. in thickness; scales of catkins hairy, lobes obtuse, subequal, diverging; nutlet elliptical and the wings not broader than the body.

(“Lenta” is the Latin for pliant, tough.)

A handsome, medium-sized tree, sometimes attaining the height of 80 ft. (24 m.) and 4 ft. (1.20 m.) in thickness of trunk, with smooth, reddish-brown bark on the limbs and young stocks very much like that of the Cherry-tree — and hence its name, Cherry Birch. On older trunks the outer layer breaks up into hard ligneous scales or plates. The bruised leaves, twigs and inner bark of this tree possess a delightful, aromatic flavor and fragrance very much like that of the Wintergreen (Gaultheria).

Habitat.—Canada, north-eastern United States and southward along the Alleghanies.

Physical Properties.—Wood heavy, hard, very strong, close-grained and taking a beautiful satiny polish; heart-wood reddish-brown; sap-wood yellowish-white. Specific Gravity, 0.7617; Percentage of Ash, 0.26; Relative Approximate Fuel Value, 0.7597; Coefficient of Elasticity, 141398; Modulus of Rupture, 1216; Resistance to Longitudinal Pressure, 619; Resistance to Indentation, 226; Weight of a Cubic Foot in Pounds, 47.47.

Uses.—A valuable timber in the manufacture of furniture, and, when stained, making a particularly good imitation of Mahogany and Cherry. It is very useful for small wooden-ware, and is used to considerable extent in ship-building. It makes a very good fuel. Extract of Birch, a popular flavoring for candies, etc., is largely, if not wholly, a product of this species, and is derived from an essential oil contained in the leaves, bark, etc.

Medicinal Properties.—An infusion of the leaves is sometimes used as an excitant and diaphoretic.
ORDER SALICACEAE: Willow Family.

Leaves alternate, simple, undivided and furnished with stipules, which are either scale-like and deciduous, or leaf-like and persistent. Flowers deciduous, both kinds in catkins, one under each bract or scale of the catkin, and destitute of both calyx and corolla, or the former represented by a gland-like cup; ovary 1 to 2-celled; styles wanting, or 2 and short; stigmas often 2-lobed. Fruit a 1 or 2-celled, 2-valved pod with numerous seeds springing from 2 parietal or basal placenta and furnished with long, silky down; seeds ascending, anatropous, without albumen; cotyledons flat.

Trees or shrubs of rapid growth, light wood and bitter bark.

Genus SALIX, Tourn.

Leaves generally narrow, long and pointed and usually with conspicuous stipules; bud scales single. Flowers appearing before or with the leaves in terminal and lateral cylindrical imbricated catkins, the scales or bracts of which are entire and each subtending a flower which is without calyx and bears at its base 1 or 2 small nectiferous glands. Sterile flowers with 2 (but sometimes more) distinct or united stamens. Fertile flowers: ovary ovoid-lanceolate, taper-pointed; style short; stigmas 2, short and mostly bifid. Fruit a 1-celled pod, dehiscent at maturity by two valves which roll back at the summit to liberate the numerous minute comose seeds.

Trees and shrubs with thin round branches and growing mostly along streams and in moist localities. (Salix is from the Celtic sat, near and its. water, alluding to the favorite locality of the willows.)

45. SALIX NIGRA, MARSHALL.

Black Willow.

German, Schwarze Weide; French, Saule noir; Spanish, Sauce negro.

Specific Characters.—Leaves lanceolate and lance-linear, tapering at each end, serrulate, green on both sides and smooth (when mature) excepting the midrib above and the petiole which are tomentose; stipules small, dentate and caducous. Flowers (May–June, with the leaves) in peduncled, long, loose, villous catkins, at the ends of lateral leafy shoots of the season; scales rounded or oblong, greenish-yellow, woolly and deciduous; glands large; stamens 3–6, hairy at base; ovary pedicellate, ovoid or oblong, smooth; styles short; stigma 2-cleft. Fruit matures in June, an ovoid rather long-pointed pod.

A variety of this willow known as Var. falcata has elongated scythe-shaped leaves and large, lunate, reflexed stipules.

(Nigra is the Latin for black in allusion to the dark color of the bark of the trunk.)

A small tree not often over 50 ft. (15 m.) in height or 18 inches (0.45 m.) in diameter of trunk, and often a mere shrub, of pleasing aspect owing to its pale yellow branches and bright green slender leaves. Its branches are brittle at base but otherwise pliant and tough. The bark of the trunk, especially near the base, is of a blackish gray color and rough with longitudinal ridges.

Habitat.—Canada and the Eastern and Central States to the gulf coast, also found in the far west, California, Arizona, etc., growing along the banks of streams.

Physical Properties.—Wood very light, soft, close-grained and easily worked, of a reddish-brown color with nearly white sap-wood. Specific Gravity, 0.4456; Percentage of Ash, 0.70; Relative Approximate
Fuel Value, 0.4425; Coefficient of Elasticity, 39062; Modulus of Rupture, 424; Resistance to Longitudinal Pressure, 213; Resistance to Indention, 93; Weight of a Cubic Foot in pounds, 27.77.

Uses.—The wood of this species is not of much commercial value, though useful for charcoal and fuel. The bark is rich in tannin and has been used to some extent for tanning purposes. The slender branches are sometimes employed in basket-making.

Medicinal Properties which are common to the genus are found in the bark and are readily yielded to water. A decoction of this is astringent and feebly tonic and used as a febrifuge in domestic practice. The active principle is salicin, and it has been efficacious in the treatment of rheumatism, and as an antiperiodic it appears to possess some controlling influence over malarial disorders. Salicylic acid — very valuable in medicine and the arts — can be derived from salicin, but at an expense so much greater than with other known sources as to be impracticable.*

46. SALIX ALBA, L. Var. VITELLINA, KOCH.

YELLOW WILLOW, GOLDEN OSIER.

Ger., Dotterweide; Fr., Saule jaune; Sp., Sauce amarillo.

Specific Characters.—Leaves lanceolate or elliptic-lanceolate, taper-pointed and tapering to the petiole, serrate with thickened teeth, smooth (or sometimes slightly pubescent) above and more or less supplied with silky hairs beneath; stipules small, lanceolate, deciduous. Flowers (May with the leaves) in peduncled, long, loose catkins at the ends of lateral leafy shoots of the season; scales ovate-lanceolate, greenish-yellow, pubescent outside and deciduous; stamens 2; ovary nearly sessile, ovate-lanceolate, smooth; styles very short; stigmas thick, 2-lobed, recurved. Fruit matures in June.

Variety vitellina differs from the true alba in having bright yellow branches and shorter and broader leaves. Another variety (Var. coerulea) has leaves quite smooth beneath and are of a bluish cast.

A fine large willow of very rapid growth, sometimes 60 ft. (18 m.) in height and 3 or 4 ft. (1 m.) in diameter of trunk, with smooth bright yellow twigs and brownish-gray roughly furrowed bark of trunk.

Habitat.—Introduced into this country from Europe and now very common, seemingly almost naturalized. It is a tree of wide range and grows luxuriantly wherever set in sufficiently damp soil.

Physical Properties.—Wood soft, light, not strong, easily worked and taking a beautiful polish. The abundant sap-wood is nearly white and the irregular heart-wood reddish-brown, most marked along the line of transition.

Uses.—The most important use is as a shade tree, for wind-breaks and for setting along the banks of streams to prevent erosion. For this

it is invaluable owing to the ease with which it is started and its very rapid growth. Stakes made from vigorous branches before the sap has started in the spring are simply driven into the ground and nature does the rest. They soon take root, send out branches and after getting well started grow with wonderful rapidity, sometimes increasing nearly or quite two inches in diameter in a season. The timber is used to some extent for fencing, fuel, etc., and its cottony fiber would suggest its value for paper-pulp. It makes a valuable charcoal and the ashes are rich in potash. The bark abounds in tannin and is of use for tanning purposes, and the small branches are used in basket making.

MEDICINAL PROPERTIES.—Those mentioned of the Black Willow (S. nigra) are equally true of this.

**Genus POPULUS, Tourn.**

Leaves broad, more or less heart-shaped or ovate, and petioles, which are long and often vertically compressed. Flowers appearing before the leaves in long, drooping, lateral, cylindrical catkins, the scales of which are furnished with a fringed margin: calyx represented by an oblique, cup-shaped disk with entire margin; stamens 8–30 or more, with distinct filaments; pistil with very short, bifid style, and large, 2-lobed stigma. Fruit as described for the order.

Represented by rather large trees. (A Latin word, meaning the people, and applicable either from the fact that these trees are often set along public walks, or in allusion to the tremulous leaves which are in constant agitation like a crowd of people.)

**47. POPULUS BALSAMIFERA, L.**

**BALSAM Poplar, Tacamahac.**

Ger., Balsampappel; Fr., Peuplier baumier.; Sp., Alamo balsamico.

Specific Characters.—Leaves ovate, pointed, finely and closely serrate, smooth both sides, whitish and reticulate-veined beneath; buds in spring large and copiously covered with a fragrant aromatic varnish; branchlets terete. Flowers appear in April or May, the sterile catkins 2–3 inches and the fertile 4–6 inches in length; stamens very numerous, purple; scales of catkin dilated, laciniate-fringed and slightly hairy.

A variety of this species known as var. candicans, and popularly as the Balm of Gilead, has broader, heart-shaped leaves and commonly hairy petioles. It is ranked by some authors as a distinct species.

(Balsamifera is the Latin for balsam bearing, alluding to the balsamic varnish found on the buds.)

A tall tree, sometimes attaining the height of 80 ft. (24 m.) and 6 or 7 ft. (2 m.) in diameter of trunk.

Habitat.—Northern United States, Canada and north-westward to Alaska, preferring the damp soil of the low-lands, river banks, etc.

Physical Properties.—Wood very light, soft, close-grained and not strong; sap-wood thick and nearly white; heart-wood reddish-brown. Specific Gravity, 0.3635; Percentage of Ash, 0.66; Relative Approximate
**Populus Monolifera — Cottonwood.**

*Fuel Value, 0.3611; Coefficient of Elasticity, 85690; Modulus of Rupture, 550; Resistance to Longitudinal Pressure, 320; Resistance to Indentation, 75; Weight of a Cubic Foot in Pounds, 22.65.*

**Uses.**—Little use is made of this timber, so far as we are aware, excepting for paper pulp, for which it is excellent.

**Medicinal Properties.**—The virtues of poplar buds are probably analogous to those of the turpentines and balsams. They have been used in pectoral, nephritic and rheumatic complaints in the form of tincture; and a liniment made by macerating them in oil has been applied externally in rheumatism. It has been ascertained that poplar buds are capable of imparting a principle to ointments which in a powerful degree obviates their tendency to rancidity.*

**Note.**—Captain Franklin, in speaking of the Balsam Poplar, noted that it constituted “the greater part of the drift timber that we observed on the shores of the Arctic Sea.” This would indicate the prevalence of the timber in the far north.

**48. Populus Monolifera, Ait.**

**Cottonwood, Necklace Poplar, White Wood, Big Cottonwood.**

*Ger., Rosenkranz-Pappel: Fr., Peuplier; Sp., Alamo de collar.*

**Specific Characters.**—Leaves broadly deltoid or deltoid-ovate, smooth, but with prominent veins, serrate-dentate with incurved, slightly hairy and cartilaginous teeth, truncate or somewhat heart-shaped and nearly entire at base, taper-pointed, 2-4 inches in length; length of petiole and length and width of blade about the same; leaf-buds varnished; branchlets angled, becoming terete. Flowers appear in April or May, the fertile catkins recurved or pendulous and very long (4-8 inches) with capsules remote; scales of catkin laciniate-fringed (not hairy); stigmas very large, nearly sessile and toothed.

*(Monolifera is from the Latin monolium, a necklace, and fero, I bear, in allusion to the long, necklace-like fruiting catkins.)*

A large tree, attaining the height sometimes of 150 ft. (45 m.) and 6 or 7 ft. (2 m.) or more in diameter of trunk. The old trunks have a dark and longitudinally furrowed bark. The large, varnished buds are a conspicuous feature when the leaves are off, and the tree presents a striking appearance when in fruit on account of the long, fruiting catkins—the “necklaces”—which it bears in abundance. Later every gust of wind, for a time, bears away some of its delicate white cotton with appended seeds. This “cotton” gives to the tree its popular name, Cottonwood, and is a provision of nature for disseminating the seeds.

**Habitat.**—From western New England southward to Florida and westward to the Rocky Mountains, in moist soil along streams, lake

shores, etc. It is particularly abundant along the streams of the western plains.

Physical Properties.—Wood very light, soft, close-grained and not strong, of a brownish color, with very thick, nearly white, sap-wood. Specific Gravity, 0.3889; Percentage of Ash, 0.96; Relative Approximate Fuel Value, 0.3852; Coefficient of Elasticity, 99417; Modulus of Rupture, 770; Resistance to Longitudinal Pressure, 353; Resistance to Indentation, 83; Weight of a Cubic Foot in Pounds, 24.24.

Uses.—A timber used to some extent for cutter dashes, light boxes, etc., but is particularly valuable for paper pulp owing to its long cottony fibre.

Medicinal Properties.—None are ascribed to this species, though those mentioned of the Balsam Poplar would probably be found to be true of this also.

Note.—We have seen on Rev. Dr. J. Jones’ grounds at Aurora, N. Y., a fine tree of this species measuring eight feet in diameter at base. It has a full and very wide-spreading top, though not very great height, and is certainly a magnificent tree.

Gymnospermae.

Flowering, exogenous plants with leaves chiefly parallel-veined and cotyledons frequently more than two. Flowers diclinous and very incomplete; pistil represented by an open scale or leaf, or altogether wanting, with ovules naked, fertilized by direct contact with the pollen, and seeds at maturity naked — without a true pericarp.

Order Coniferae: Pine Family.

Leaves mostly awl-shaped or needle-shaped, evergreen, entire and parallel-veined. Flowers monoecious, or rarely dioecious, in catkins or cones, destitute of both calyx and corolla; stamens one or several (usually united); ovary, style and stigma wanting; ovules one or several at the base of a scale, which serves as a carpel, or on an open disk. Fruit a cone, woody and with distinct scales, or somewhat berry-like, and with fleshy coherent scales; seeds orthotrophic, embryo in the axis of the albumen.

Trees or shrubs with a resinous juice.

Genus Pinus, Tourn.

Leaves evergreen, needle-shaped, from slender buds, in clusters of 2-5 together, each cluster invested at its base with a sheath of thin, membraneous scales. Flowers appearing in spring, monoecious. Sterile flowers in catkins, clustered at the base of the shoots of the season; stamens numerous with very short filaments and a scale-like connective; anther cells, 2, opening lengthwise; pollen grains triple. Fertile flowers in conical or cylindrical spikes — cones — consisting of imbricated, carpellary scales, each in the axil of a persistent bract and bearing at its base within a pair of inverted ovules. Fruit maturing in the autumn of the second year, a cone formed of the imbricated carpellary scales, which are woody, often thickened or awned at the apex, persistent, when ripe dry and spreading to liberate the two nut-like winged seeds; cotyledons 3-12, linear.

(Pinus is a Latin word from Celtic pin or pen, a crag.)
49. **PINUS STROBUS—WHITE PINE.**

49. **PINUS STROBUS, L.**

**WHITE PINE, WEYMOUTH PINE.**

Ger., *Weimuthskiefer*; Fr., *Pin blanc*; Sp., *Pino blanco*.

**Specific Characters.**—Leaves slender, glaucous, in 5s, with a short, loose-scaled, deciduous sheath enveloping the base of each fascicle. Sterile catkins 5 or 6 together, ovoid, about ½ in. (1 cm.) long and with 6–8 involucral scales at base. Cones 4–6 in. (10–15 cm.) long, terminal, solitary, cylindrical and often curved, loose, pendant and falling after shedding the seeds; scales slightly, if at all, thickened at the tips and not furnished with a prick; seed smooth; cotyledons 8–10.

(Strobus is a classical name of a tree.)

A majestic tree, tallest of our eastern forests, it sometimes towers to the height of 160 ft. (49 m.) or more, with a straight, columnar trunk, perhaps 8 ft. (2.40 m.) in diameter, and free from branches for 80–100 ft., it holds its entire top above the heads of the surrounding trees. The bark is comparatively smooth, but on old trunks it is rendered rough with longitudinal furrows and firm ridges. Its tufted foliage of fine bluish-green needles are recognizable at once.

**Habitat.**—Canada, the North-eastern States, and southward along the Alleghanies to Georgia, growing best in a damp, sandy soil. It is preeminently a tree of the valley of the St. Lawrence river and the Great Lakes, where, in places, it forms extensive tracts of forests.

**Physical Properties.**—Wood very soft, light, compact, straight-grained, easily worked, of a delicate pinkish-brown color with lighter and thin sap-wood. One point of considerable value is the comparatively small degree to which it shrinks and swells owing to changes in the atmosphere. Specific Gravity, 0.3854; Percentage of Ash, 0.19; Relative Approximate Fuel Value, 0.3847; Coefficient of Elasticity, 85093; Modulus of Rupture, 626; Resistance to Longitudinal Pressure, 339; Resistance to Indentation, 74; Weight of a Cubic Foot in Pounds, 24.02.

**Uses.**—The most useful and indispensable tree of the American forests, affording a timber of greatest value for many uses, as for finishing, interior work, doors, sash and blinds, for shingles, etc., etc. Indeed, builders would hardly know what to do without White Pine in many places. Owing to its lightness, it is of great value for the masts and spars of vessels.

**Medicinal Properties.**—None are known of this species.
50. PINUS RIGIDA, Miller.

Pitch Pine.

Ger., Pechkiefer; Fr., Pin de goudron; Sp., Pino de pez.

Specific Characters. — Leaves 3–6 in. (8–15 cm.) long, rigid, dark green, arranged in 3s, with a short, close sheath enveloping the base of each fascicle. Sterile catkins clustered, slender, oblong, ovoid, with 6–8 involucral scales at the base. Cones lateral, pyramidal-ovoid, 1–3 in. (2.5–3 cm.) in length, often clustered, and with scales thickened at the end and furnished with a short, thick, recurved prickles, persistent after shedding the seeds, which are scarcely, if at all, ridged beneath; cotyledons usually 5.

(Rigida is the Latin for stiff, rigid, alluding to the leaves.)

A tree conspicuous on account of its tufted dark-green foliage of coarse, rigid needles, and the dark color of the bark of its trunk rough with large and prominent longitudinal ridges, the outer surface of which flakes off in small, irregular scales. It attains the height sometimes of 80 ft. (24 m.) and 3 ft. (0.90 m.) in thickness of trunk.

Habitat. — Eastern and Southern Canada and southward, particularly along the Atlantic States to Georgia, growing mostly in sandy, barren soil.

Physical Properties. — Wood light, soft, not strong, with coarse, conspicuous grain, and abundantly supplied with resin. The heart-wood is of a light brownish-red color and sap-wood yellowish-white. Specific Gravity, 0.5151; Percentage of Ash, 0.23; Relative Approximate Fuel Value, 0.5139; Coefficient of Elasticity, 58127; Modulus of Rupture, 739; Resistance to Longitudinal Pressure, 355; Resistance to Indentation, 133; Weight of a Cubic Foot in Pounds, 32.10.

Uses. — Used to some extent for coarse lumber, flooring, sills, etc., to some extent for charcoal, and it is said considerable tar, turpentine and lampblack has been procured from this tree. The great amount of resin which the wood contains makes it very inflammable, and hence it is of great value for fuel, especially for engines, etc., for use in brick-making, etc.

Medicinal Properties. — The medicinal properties claimed of this species are those found in the turpentine, tar, etc., sometimes derived from it, but, as by far the greater part of those products are derived from the Georgia Pine (P. palustris), mention of them will be reserved to be given with that species.
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<tr>
<td>Elm</td>
<td>41</td>
<td>Yellow</td>
<td>46</td>
</tr>
<tr>
<td>Weide, Schwarze</td>
<td>42</td>
<td>Willow Family</td>
<td>36</td>
</tr>
<tr>
<td>Weisseiche</td>
<td>43</td>
<td></td>
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</tr>
</tbody>
</table>

### ERRATUM.

Instead of *monolifera*, in *Populus monolifera*, No. 48, page 39 and elsewhere, read *monilifera*, and consider its derivation from (Latin) *monile* instead of *monilium*, both which words mean *necklace*, and *fero*, *I bear*. 
26. ACER DASYCARPUM, EHRHART.
Silver-leaved Maple, White or Silver Maple, Soft Maple.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

Ger. Silberblätteriger Ahorn. Fr. Erable blanc.
Sp. Arce con hojas plateadas.

Published and Sections made by Romona B. Hough, B. A., Lowville, N. Y., U. S. A.
26. ACER DASYCARPUM, EHRHART.
Silver-leaved Maple, White or Silver Maple, Soft Maple.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

Ger. Silberblätteriger Ahorn.  Fr. Erable blanc.
Sp. Arce con hojas plateadas.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
26a. ACER DASYCARPUM, EHRHART.
Silver Maple - Curly Figure, Curly Maple.

Gegr. Gekränzelter Ahorn. Fr. Erable frisé.
Sp. Arce rizado.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
26a. ACER DASYCARPUM, EHRHART.
Silver Maple - Curly Figure, Curly Maple.

English

German

French

Spanish

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
27. GYMNOCladus CANADENSIS, Lam.

Coffee-Tree.

Transverse Section.

Radial Section.

Tangential Section.

Sp. Arbol de café falso.

Published and Sections made by Romeyn B. Hough, B.A., Lowell, N. Y., U. S. A.
27. GYMNOCCLADUS CANADENSIS, LAM.

Coffee-Tree.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

Sp. Arbol de café falso.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
28. GLEDITSCHIA TRIACANTHOS, L.
Honey Locust, Black or Sweet Locust, Three-thorned Acacia.
28. GLEDITSCHIA TRIACANTHOS, L.
Honey Locust, Black or Sweet Locust, Three-thorned Acacia.

**TRANVERSE SECTION.**

**RADIAL SECTION.**

**TANGENTIAL SECTION.**

Ger. Dreiborniger Honigdorn. Fr. Fevier à trois épines.
Sp. Algarrobo de miel.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
29. PRUNUS SEROTINA, EHRH.
Wild Black Cherry.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

Sp. Cereza silvestre negra.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
29. PRUNUS SEROTINA, EHRH.
Wild Black Cherry.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

Sp. Cereza silvestre negra.

Published and Sections made by Romeyn B. Hough, B. A., Lowvile, N. Y., U. S. A.
30. **PYRUS MALUS, L.**

Apple.

**TRANVERSE SECTION.**

**RADIAL SECTION.**

**TANGENTIAL SECTION.**

**Ger.** Apfelbaum. **Fr.** Pommier. **Sp.** Manzana.
30. PYRUS MALUS, L.  
Apple.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
31. FRAXINUS PUBESCENS, LAM.
Red Ash, Gray Ash.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
31. FRAXINUS PUBESCENS, LAM.

Red Ash,  Gray Ash.


Published and Sections made by Romeyn B. Hough, B.A., Lowville, N. Y., U. S. A.
32. SASSAFRAS OFFICINALE, NEES.

Sassafras.

TRANVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
32. SASSAFRAS OFFICINALE, NEES.

Sassafras.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, B. A., Lewville, N. Y., U. S. A.
33. **ULMUS AMERICANA, L.**

White Elm, Water Elm, American Elm.

**GER.** Weisse Ulme, Rüster.  **FR.** Orme parasol.  **SP.** Olmo blanco.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
33. **ULMUS AMERICANA, L.**

White Elm, Water Elm, American Elm.

**Transverse Section.**

**Radial Section.**

**Tangential Section.**


Sp. Olmo blanco.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
34. **ULMUS RACEMOSA, THOMAS.**
Cork Elm, Rock Elm, Cliff Elm, White Elm.

**TRANSVERSE SECTION.**

**RADIAL SECTION.**

**TANGENTIAL SECTION.**

Ger. Trauben Ulme. Fr. Orme à grappa.
Sp. Olmo de corcho.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
34. ULMUS RACEMOSA, THOMAS.
Cork Elm, Rock Elm, Cliff Elm, White Elm.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

Ger. Trauben Ulme. Fr. Orme à grappa.
Sp. Olmo de corcho.

Published and Sections made by Remoyn R. Haush, R.A., Louisville, N.Y., U.S.A.
35. JUGLANS NIGRA, L.

Black Walnut.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
35. JUGLANS NIGRA, L.
Black Walnut.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

Sp. Nogal negro,

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
36. CARYA ALBA, NUTT.
Shell-bark Hickory, Shag-bark Hickory.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

Sp. Nogal de America.
36. CARYA ALBA, NUTT.
Shell-bark Hickory, Shag-bark Hickory.

German: Rindenschälende Hickory
French: Noyer tendre
Spanish: Nogal de America

Published and Sections made by Romeyn B. Hough, B. A., Covina, N. Y., U. S. A.
37. CARYA AMARA, NUTT.
Bitter-nut Hickory, Swamp Hickory.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

37. CARYA AMARA, NUTT.

Bitter-nut Hickory, Swamp Hickory.

**GER.** Bitterfrüchtige Hickory. **Fr.** Noyer amer.

**Sp.** Nogal amargo.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
38. QUERCUS ALBA, L.
White Oak.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Honeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
38. QUERCUS ALBA, L.

White Oak.

Transverse Section.

Radial Section.

Tangential Section.


Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
39. *QUERCUS MACROCARPA*, *MICHX.*

*Burr Oak, Mossy-cup Oak, Over-cup Oak.*

**TRANSVERSE SECTION.**

**RADIAL SECTION.**

**TANGENTIAL SECTION.**


Sp. Roble con bellotas musgosas.

Published and Sections made by ROMEYN B. HOOGH, B. A., LOWVILLE, N. Y., U. S. A.
39. QUERCUS MACROCARPA, MICHX.
Burr Oak, Mossy-cup Oak, Over-cup Oak.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

Sp. Roble con bellotas musgosas.

Published and Sections made by Romeyn B. Hough, B.A., Lowville, N.Y., U.S.A.
40. CASTANEA VESCA VAR. AMERICANA, MICHX.

Chestnut.

 TRANSVERSE SECTION.

 RADIAL SECTION.

 TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
40. CASTANEA VESCA VAR. AMERICANA, MICHX.

Chestnut.

**TRANSVERSE SECTION.**

**RADIAL SECTION.**

**TANGENTIAL SECTION.**


Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
41. OSTRYA VIRGINICA, WILDL.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

Sp. Ojaranzo de lupulo.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
41. OSTRYA VIRGINICA, WILDL.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

Sp. Ojaranzo de lupulo.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
42. CARPINUS CAROLINIANA, WALT.
Hornbeam, Blue Beech, Water Beech, Iron-wood,

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, B. A., Lowell, N. Y., U. S. A.
42. CARPINUS CAROLINIANA, WALT.
Hornbeam, Blue Beech, Water Beech, Iron-wood,
43. BETULA PAPYRACEA, Ait.
Canoe Birch, Paper Birch, White Birch.

TRANVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

43. BETULA PAPYRACEA, AIT.
Canoe Birch, Paper Birch, White Birch.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough. B. A., Lowville, N. Y., U. S. A.
44. BETULA LENTA, L.
Sweet Birch, Cherry Birch, Black or Mahogany Birch.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

44. BETULA LENTA, L.
Sweet Birch, Cherry Birch, Black or Mahogany Birch.

**TRANSVERSE SECTION.**

**RADIAL SECTION.**

**TANGENTIAL SECTION.**


Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
45. *SALIX NIGRA, MARSHALL.*
Black Willow.

*TRANSVERSE SECTION.*

*RADIAL SECTION.*

*TANGENTIAL SECTION.*


Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
45. SALIX NIGRA, MARSHALL.
Black Willow.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, B. A., Lowell, N. Y., U. S. A.
46. SALIX ALBA, L. var. VITELLINA, KOCH.

Yellow Willow, Golden Oyster.

46. SALIX ALBA, L. VAR. VITELLINA, KOCH.

Yellow Willow, Golden Osier.

Transverse Section.

Radial Section.

Tangential Section.


Published and Sections made by Romeyn B. Hough, B. A., Louisville, N. Y., U. S. A.
47. **POPULUS BALSAMIFERA, L.**

Balsam Poplar, Tacamahac.

**TRANSVERSE SECTION.**

**RADIAL SECTION.**

**TANGENTIAL SECTION.**

Sp. Alamo balsámico.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
47. *POPULUS BALSAMIFERA*, L.

Balsam Poplar, Tacamahac.

*Transverse Section.*

*Radial Section.*

*Tangential Section.*


*Sp.* Alamo balsámico.
48. POPULUS MONOLIFERA, AIT.
Cottonwood, Necklace Poplar, White Wood, Big Cottonwood.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, R. A., Louisville, N. Y., U. S. A.
48. **POPULUS MONOLIFERA, AIT.**
Cottonwood, Necklace Poplar, White Wood, Big Cottonwood.

**TRANSVERSE SECTION.**

**RADIAL SECTION.**

**TANGENTIAL SECTION.**


Published and Sections made by Romaya B. Hough, B. A., Lowville, N. Y., U. S. A.
49. PINUS STROBUS, L.H.
White Pine, Weymouth Pine.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
49. PINUS STROBUS, L.H.
White Pine, Weymouth Pine.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
50. PINUS RIGIDA, MILLER.

Pitch Pine.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, P. A., Lowville, N. Y., U. S. A.
50. PINUS RIGIDA, MILLER.

Pitch Pine.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.


Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.
The above scale of sizes is based upon the metric system of measurement, the number of any size being intended to designate its length in centimeters; the widths varying eight millimeters successively from the width of No. 9 (5 cm.) as a starting point.

N. B.—In using water colors for decorating these cards avoid having them too moist and with oil colors “cut” the oil by the admixture of a little turpentine. For perforating the cards, as for mounting on ribbon, etc., use a solid or “conductor’s” punch; and when using with glue, as in panel work, use “Royal” or fish glue and place it not upon the card but, upon the surface the card is to be glued to.