

TREES IN WINTER

THEIR STUDY AND
IDENTIFICATION

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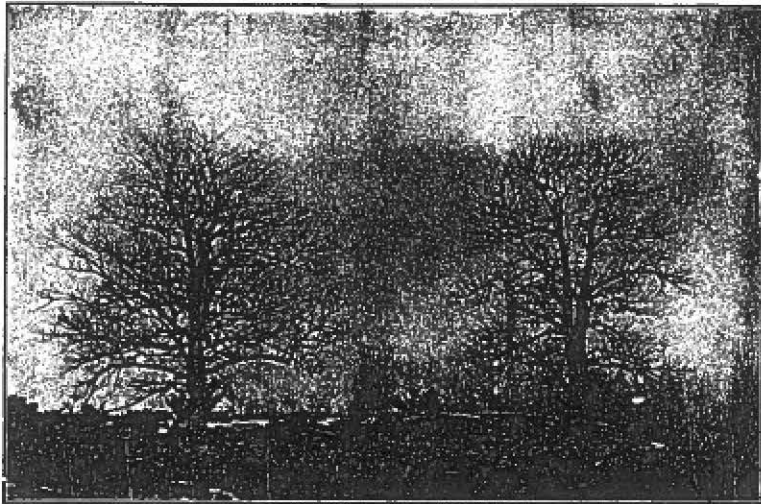
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OAK AND CHESTNUT IN WINTER AND IN SUMMER

CHAPTER III

ANALYTICAL KEY TO IDENTIFICATION

METHOD OF USE

Despite the fact that the appearance of the bark and the method of branching are almost exclusively depended upon by the experienced woodsman in recognition of species, these characters are difficult of precise description and not adapted to use in a key. The twigs therefore with the scaly buds and leaf-scars are used as a basis of the following keys. The word "twig" in the sense here used, it should be remembered, denotes the growth of the past season only, and the word "bark" refers to the bark of the trunk and older limbs and not of the twigs or branchlets. The student should read the foregoing chapter and note the limitation of terms and characters used in the following pages.

Before attempting to identify an unknown tree it is necessary to have good material to work with. Care should be taken that the twigs selected are normal in appearance, being neither abnormally stunted in growth nor unusually elongated as are twigs on young sprouts. Frequently the species may be determined by an inspection of the twigs alone, but notes on the character of the bark and the habit of growth as well as specimens of the fruit will generally be found useful and sometimes necessary.

In the key a choice is given between two paragraphs preceded by the same number. This choice leads to a new number or to the name of the species followed by the page where a detailed description of the tree may be found. The White Ash may be used to show the method of procedure. Starting with No. 1 we have the choice between trees with "leaves persistent and green throughout winter" and trees with "leaves *not* persistent and green throughout winter." We choose the latter and this takes us to No. 11 where the decision must be made between "leaf-scars opposite or in 3's" and "leaf-scars alternate." The leaf-scars on the Ash are opposite and we take the first 11 and are led to No. 12. At 12 we have the alternative between "leaf-scars, or some of them, 3 at a node" and "leaf-scars always 2 at a node." The first pair of contrasting characters mentioned are always the most important. The constant presence in the Ash of two leaf-scars at a node is

sufficient to cause us to choose the second 12, and our choice is corroborated by the position of the bundle-scars and by the presence of a terminal bud, so we pass to 13. The upper lateral buds of the Ash are not covered by persistent bases of leaf-stalks and there are 2 or more pairs of scales to the leaf buds; we therefore pass to 14. The relatively small size of the buds and their freedom from stickiness takes up to 15 where the number of the bundle-scars and the other characters given show us that we have in hand a twig of one of the Ashes. We now turn to No. 165 and confirm our determination of the genus by reading the general description of the Ashes. To find out which Ash we are dealing with we proceed with the key of the Ashes and, knowing that the leaf-scars in our specimens are deeply concave on their upper margins, we conclude that we have the White Ash (*Fraxinus americana*). At page 270 we find a detailed description with photographic illustrations of this species and may learn the winter characters of the tree not already given in the key. If the description and photographs do not correspond to the tree under investigation, we know that we have gone astray at some point in the key, and turning back we repeat the analysis, taking if need be the other alternative of a pair where the choice had been doubtful.

The meaning of unfamiliar terms may generally be found in the glossary. Often, however, the photograph offers a better explanation. Thus in distinguishing the Carolina from the Lombardy Poplar, the word "spire-shaped" as applied to the habit can best be understood by reference to the picture of the latter species. When a choice within a number seems impossible from the information available, trial should be made of both contrasting paragraphs. In the key to the Oaks, for example, the character of the bark — whether flaky or not flaky — is used as a distinguishing mark. With only the twig at hand, it may still be possible to trace the name by trying the tree first under "bark flaky" and if this does not lead to the correct name, then under "bark not flaky." It might seem needless to suggest that both the contrasted parts of each number encountered should be read but work with students has shown that such a suggestion may be useful.

Sometimes a tree is variable in the characters used in the key. Thus the Chestnut has terminal buds sometimes present on the

twigs though they are generally absent. In such cases, however, and where there is a legitimate doubt as to whether the tree should be placed in the first or the second group, it has generally been placed in both so that either of the two choices should lead to the correct name. The determination of the presence or absence of the terminal bud is perhaps the greatest pitfall likely to be found in the use of the key, but should give little difficulty if the discussion in Chapter I is understood and the terminal scar is looked for with the aid of a hand-lens.

KEY TO GENERA AND SPECIES

1. Leaves persistent and green throughout winter (Evergreens) ... 2
1. Leaves not persistent and green throughout winter (dead leaves often persistent in the Oaks and Beeches) 11
2. Leaves broad, prominently spiny-margined. Holly (*Ilex opaca*) p.244
2. Leaves narrow, often minute and scale-like; Conifers (i.e. cone-bearing trees) 3
3. Leaves, except scale-leaves, needle-shaped, in definite, generally sheathed clusters on the sides of the branches Pine (*Pinus*) 85
3. Leaves, not in definite clusters 4
4. Leaves opposite or in 3's, therefore 2 or 3 at a node 5
4. Leaves alternate, scattered, therefore only 1 at a node 8
5. Leaves whorled in 3's, all alike, whitened above and green below, awl-shaped, sharp-pointed and spreading; fruit bluish, berry-like; a shrub or low tree (see also juvenile condition of Red Cedar) ..
5. Leaves opposite in 4 ranks, minute, scale-like, closely overlapping 6
6. Young twigs prominently flattened and forming a flat, 2-ranked, fan-shaped spray often mistaken for the true leaves which are minute and of two shapes, those on edges of twig being narrower, those on flat sides being broader and more abruptly pointed with each leaf generally showing a conspicuous raised glandular dot; fruit a thin-scaled, oblong, woody cone
6. Young twigs not prominently flattened; fruit spherical 7
7. Spray somewhat fan-shaped; young twigs not prominently 4-angled; leaves all alike in shape, some of them with prominent raised glandular dot on back; fruit a spherical woody cone
7. Spray not fan-shaped; young twigs with typical leaves are prominently 4-angled; leaves without conspicuous glandular dots, of two kinds: (a) the juvenile form—awl-shaped, spiny-pointed and spreading, in 2's or 3's at a node and resembling leaves of Common Juniper, the usual leaf form on young trees but generally to be found on some parts of older trees; (b) the typical form—smaller, scale-like and closely appressed; fruit bluish, berry-like.
8. Leaves distinctly flattened 9
8. Leaves not distinctly flattened, needle-shaped, 4-angled, sessile on projections of the bark. Spruce (*Picea*) 91
9. Leaf about 1 cm. long with definite leaf-stalk, leaving prominently projecting scar when detached. Hemlock (*Tsuga canadensis*) p.56
9. Leaf about 2 cm. or more long, without leaf-stalk, leaving a flat or only slightly raised scar when detached 10
10. Buds small, nearly spherical to broadly ovate, their scales covered and glued together by resinous coating; leaf-scars flat
10. Buds larger, narrow conical, without resinous coating; leaf-scars slightly raised Douglas Fir (*Pseudotsuga taxifolia*) p.82
11. Leaf-scars opposite or in 3's, therefore 2 or 3 at a node 12
11. Leaf-scars alternate, therefore only 1 at a node 16
12. Leaf-scars or some of them 3 at a node; bundle-scars in an ellipse; terminal bud absent
12. Leaf-scars always 2 at a node; bundle-scars not in an ellipse; terminal bud present
13. Leaf buds with only a single pair of scales; lateral buds, at least the upper ones, covered by persistent bases of leaf-stalks
13. Leaf buds with 2 or more pairs of scales; lateral buds not covered by persistent bases of leaf-stalks 14

14. Terminal buds large, over 1.5 cm. long, sticky or varnished; leaf-scar large, inversely triangular; bundle-scars 3-9, conspicuous. *Horse-chestnut* (*Aesculus hippocastanum*) p.262
14. Terminal buds smaller, under 1.5 cm. long, not sticky-varnished; leaf-scars smaller 15
15. Bundle-scars, minute, numerous in a U-shaped line often more or less confluent; bud-scales scurfy (i.e. rough-downy). *Ash* (*Fraxinus*) p.165
15. Bundle-scars not minute, generally definitely 3 in number; bud-scales not scurfy. *Maple* (*Acer*) p.155
16. Stipule-scars entirely encircling the twig 17
16. Stipule-scars absent or if present not encircling the twig 19
17. Leaf-scar almost completely surrounding the bud; terminal bud absent; (the last lateral bud may appear to be terminal but absence of terminal bud is shown by small scar at end of twig). *Sycamore* (*Platanus*) p.196
17. Leaf-scar not surrounding the bud; terminal bud present 18
18. Buds ovate to conical, hairy at least within; scar of rudimentary leaf surmounting decurrent ridge on side of bud *Magnolia* (*Magnolia*) p.142
18. Buds flattened oblong, smooth without and within; scar of rudimentary leaf, if present, at base of bud. *Tulip Tree* (*Liriodendron tulipifera*) p.185
19. Twigs with thorns, spines, or prickles, or branches ending in thorns 20
19. Twigs without thorns, spines, or prickles 27
20. Spines in pairs at the nodes, or twigs covered with weak hair-like prickles 21
20. Spines not in pairs at the nodes, twigs not covered with weak prickles 22
21. Buds rusty-hairy, more or less covered by bark; terminal bud absent *Locust* (*Robinia*) p.236
21. Buds, red, exposed; terminal bud present; a shrub *Prickly Ash* (*Zanthoxylon americanum*) under Comparisons p.236
22. Thorns lateral, regularly placed on the twig at or near the nodes 23
22. Thorns terminal 25
23. Thorns generally branched, situated above the nodes; buds several in a longitudinal row, the lower ones covered by the bark. *Honey Locust* (*Gleditsia triacanthos*) p.230
23. Thorns generally unbranched on twigs, situated at the nodes; sometimes branched thorns on trunk; buds exposed 24
24. Thorns generally present at all the nodes; bundle-scar single. *Osage Orange* (*Maclura pomifera*) under Comparisons p.208
24. Thorns generally absent from many of the nodes; bundle-scars 3. *Hawthorn* (*Crataegus*) p.208
25. Terminal bud absent but leaving a terminal scar on twig. *Plum* (*Prunus*) p.151
25. Terminal bud present, at least on spineless branches 26
26. Tree with bushy habit of growth; twigs with characteristic licorice-like taste, generally reddish-brown, more or less pale-woolly at least toward apex; lateral buds blunt, flattish, appressed and more or less pale-woolly *Apple* (*Pyrus malus*) p.200
26. Tree with upright habit of growth; twigs without characteristic taste, generally yellowish green and generally smooth; lateral buds sharp-pointed, smooth or sometimes slightly downy, generally not flattened nor appressed *Pear* (*Pyrus communis*) p.195
27. Pith in section lengthwise of twig seen to be interrupted by hollow chambers or by thin woody partitions (the partitions are frequently inconspicuous). 28
27. Pith continuous, i.e. without hollow chambers or woody partitions 32

28. Pith chambered but with chambers confined to the nodes. *Hickory* (*Carya*) p.101
28. Pith when chambered with chambers not confined to the nodes 29
29. Pith brown, wide, with hollow chambers; fruit a nut 30
29. Pith light colored, narrow; fruit a small stone-fruit 31
30. Downy patch present above leaf-scar; nut elongated. *Butternut* (*Juglans cinerea*) p.112
30. Downy patch absent from leaf-scar; nut round. *Black Walnut* (*Juglans nigra*) p.114
31. Pith with hollow chambers; buds brown, terminal bud absent, lateral buds appressed. *Hackberry* (*Celtis occidentalis*) p.175
31. Pith with woody partitions in the solid ground-mass; buds reddish, terminal bud present, lateral buds divergent. *Tupelo* (*Nyssa sylvatica*) p.268
32. Leaf-scars regularly 2-ranked, i.e. arranged in 2 longitudinal rows on the twig 33
32. Leaf-scars regularly more than 2-ranked, i.e. in more than 2 rows on the twig 49
33. Terminal bud absent (the last lateral bud may appear to be terminal but absence of terminal bud is shown by small scar at end of twig) 39
33. Terminal bud present 34
34. Stipule-scars nearly encircling twig; buds long and narrow, generally over 5 times as long as wide, divergent; bud-scales in pairs, 4-ranked, 10 or more scales visible. *Beech* (*Fagus*) p.142
34. Stipule-scars when present relatively short; buds stouter, generally not over 4 times as long as wide; bud-scales less numerous 35
35. Buds stalked 36
35. Buds not stalked 37
36. Buds, for the most part naked, i.e. with undeveloped leaves serving the function of scales; woody, 4-parted fruits and the remains of last season's flowers generally present *Witch Hazel* (*Hamamelis virginiana*) p.192
36. Buds covered with bud-scales; fruit a woody cone-like catkin. *Alder* (*Alnus*) p.140
37. Leaf-scars very narrow, V-shaped, swollen at the 3 bundle-scars; buds long, appressed; bud-scale tipped with dark point; stipule-scars absent. *Shad Bush* (*Amelanchier canadensis*) p.200
37. Leaf-scars relatively broad; buds shorter; bud-scale without conspicuous dark point; stipule-scars present though often inconspicuous 38
38. Bundle-scars 3; bark of young stem and branches with horizontally elongated lenticels, often peeling into papery layers; pith generally elliptical often with irregularly toothed edges; fruit a catkin, immature catkins generally present on tree in winter. *Birch* (*Betula*) p.104
38. Bundle-scars several; lenticels not horizontally elongated; bark never peeling in papery layers; pith more or less 6-pointed, star-shaped; fruit a bur. *Chestnut* (*Castanea dentata*) p.144
39. Leaf-scar almost entirely surrounding the buds; buds brown, hairy, several massed together to form a bud-like cone; bundle-scars raised, generally 6 in a single curved line. *Yellow Wood* (*Cladrastis lutea*) p.234
39. Leaf-scar not more than half surrounding the bud; buds not massed together into a hairy cone. 40
40. Bundle-scars 3 or more in a single curved line. 43
40. Bundle-scars more than 3 in a closed ellipse, double line, variously clustered or irregularly scattered. 41
41. 2-3 scales visible to a bud; bundle-scars not prominently projecting 42
41. 4 or more scales visible to a bud; bundle-scars rather prominently projecting *Mulberry* (*Morus*) p.141

42. Twigs usually zigzag; pith roundish; buds and twigs mucilaginous when chewed; fruit spherical, woody, about size of pea, attached to a leafy bract. Linden (*Tilia*) p.204
42. Twigs nearly straight; pith more or less 6-pointed, star-shaped; buds and twigs not mucilaginous when chewed; fruit a large bur. Chestnut (*Castanea dentata*) p.144
43. Buds superposed, at least at some of the nodes; stipule-scars absent; older pith with reddish streaks. Redbud (*Cercis canadensis*) p.232
43. Buds never superposed; stipule-scars present; pith without reddish streaks. 44
44. 2-3 scales visible to a bud 45
44. 4 or more scales visible to a bud 46
45. Buds stout; buds and twigs mucilaginous when chewed; lenticels not horizontally elongated; fruit spherical, woody, about size of pea, attached to leafy bract. Linden (*Tilia*) p.204
45. Buds narrower, buds and twigs not mucilaginous when chewed; lenticels on stems and branches horizontally elongated; bark often peeling in papery layers; fruit a winged seed-like body borne in catkins. Birch (*Betula*) 104
46. Bud-scales 2-ranked (i.e. arranged on the bud in 2 longitudinal rows); leaf-scars covered with a smooth corky layer; bundle-scars typically sunken; bark ridged; catkins absent. Elm (*Ulmus*) 138
46. Bud-scales more than 2-ranked; leaf-scars not covered with smooth corky layer; bundle-scars not sunken; fruit borne in catkins. ... 47
47. Lenticels horizontally elongated with age; bark on young trunks and branches smooth, not becoming fluted, often peeling into papery layers but not flaky; fruit a flat seed-like body borne in catkins; catkins generally present on tree in winter. Birch (*Betula*) 104
47. Lenticels not horizontally elongated; bark flaky or fluted; bud-scales 4-ranked; fruit a nutlet attached to a bract. 48
48. Bark flaky; twigs 1-2 mm. thick; buds usually 3-7 mm. long; nutlet enclosed by a sac-like bract; staminate catkins generally abundantly present in winter. Hop Hornbeam (*Ostrya virginiana*) p.124
48. Bark smooth, close, sinewy-fluted; twigs about 1 mm. or less thick; buds usually 2-4 mm. long; nutlet attached to flattish, toothed bract; staminate catkins enclosed in enlarged scaly buds, therefore no catkins visible on tree in winter. American Hornbeam (*Carpinus caroliniana*) p.126
49. Buds clustered at tips of vigorous shoots; terminal bud not greatly larger than others of the cluster 50
49. Buds not clustered at tips of vigorous shoots, or if slightly clustered, then terminal bud much larger than others of the cluster 53
50. Bundle-scars numerous, scattered; pith regularly 5-pointed, star-shaped. Oak (*Quercus*) 109 and 120
50. Bundle-scars 3; pith not 5-pointed, star-shaped 51
51. Terminal bud absent, but leaving a terminal scar on twig. Plum (*Prunus*) 150
51. Terminal bud present 52
52. Buds woolly at least at tip; collateral buds generally present. Peach (*Prunus persica*) p.224
52. Buds smooth; collateral buds generally absent 145
53. Buds stalked 54
53. Buds not stalked 56
54. Buds bright yellow dotted, often superposed. Bitternut (*Carya cordiformis*) p.122
54. Buds not bright yellow dotted, not superposed 55
55. Buds always stalked, blunt; stipule-scars present; catkins present in winter. Alder (*Alnus*) p.140

55. Buds, except occasionally on rapidly grown twigs, generally not stalked, pointed; corky ridges generally present on branchlets; stipule-scars and catkins absent. Sweet Gum (*Liquidambar styraciflua*) p.194
56. Buds sunken (i.e. partially or completely covered by the bark) for the most part minute and superposed; best seen in a section lengthwise of the twig, through the node at right angles to the surface of the leaf-scar 57
56. Buds not sunken and in most cases not superposed 59
57. Twigs very stout, generally 1 cm. or more thick; pith salmon-colored; buds bronze-silky, exposed but surrounded by an incurved downy rim of the bark; bundle-scars generally more than 3. Kentucky Coffee Tree (*Gymnocladus dioica*) p.225
57. Twigs rather slender generally less than 5 mm. thick; pith whitish not salmon-colored; bundle-scars 3 58
58. Buds smooth, distant, the uppermost breaking through the bark above the leaf-scar, the lower ones submerged, appearing in section of twig as separate green dots. Honey Locust (*Gleditsia triacanthos*) p.230
58. Buds downy, clustered together in cavity below leaf-scar Locust (*Robinia*) p.230
59. Bud-scale one, large cap-like, terminal bud absent. Willow (*Salix*) p.98
59. Bud-scales more than one or bud-scales absent; terminal bud present or absent 60
60. First or lowest scale of lateral bud directly in front (i.e. facing directly out away from twig; see fig. 15); leaf-scar covered with a light-corky layer, large inversely triangular; bundle-scars 3, often compound; pith more or less 5-pointed star-shaped. Poplar (*Populus*) 96
60. First or lowest scale of lateral bud not directly in front 61
61. Twigs branching freely the first season, therefore branches showing on last season's growth, the branches surpassing the main axis in length 62
61. Twigs generally not branching the first season or if occasionally branching then branches not surpassing main axis in length 63
62. Bundle-scar one; twigs greenish, spicy, mucilaginous when chewed. Sassafras (*Sassafras variifolium*) p.190
62. Bundle-scars 3, twigs not mucilaginous. Alternate-leaved Dogwood (*Cornus alternifolia*) under Comparisons p.260
63. Bundle-scars 1 or 2; leaf-scars, except on young shoots, mainly densely clustered on short, stout, wart-like branches 64
63. Bundle-scars 3 or more 65
64. Bundle-scar single; leaf-scars minute, scattered leaf-scars also present on twigs, very numerous and strongly decurrent; twigs slender; fruit a cone, generally present. Larch (*Larix*) 90
64. Bundle-scars 2; leaf-scars larger, scattered leaf-scars if present relatively far apart and not decurrent; twigs stouter; fruit a stone-fruit generally absent. Ginkgo (*Ginkgo biloba*) p.90
65. Bundle-scars 3 or if more than 3 then in a single curved line (bundle-scars of Bitternut p. 123 occasionally in single line) 69
65. Bundle-scars more than 3, variously grouped or scattered, but not in a single line 66
66. Stipule-scars absent; terminal bud present 68
66. Stipule-scars present; terminal bud present or absent 67
67. 2-3 bud-scales visible; bundle-scars not projecting; terminal bud present or generally absent. Chestnut (*Castanea dentata*) p.144
67. 4 or more bud-scales visible; bundle-scars projecting; terminal bud absent. Mulberry (*Morus*) 141
68. Buds large; twigs without resinous juice; fruit a nut; a tree. Hickory (*Carya*) 101
68. Buds small; twigs with resinous juice; fruit a small white drupe; a shrub growing in swamps. Poison Sumach (*Rhus vernis*) p.242

69. Bundle-scars 3 74
 69. Bundle-scars 4 or more 70
 70. Terminal bud absent, but leaving a terminal scar on twig 72
 70. Terminal bud present 71
 71. Lateral buds mostly large, twig without resinous juice; fruit red, berry-like; a small tree. Mountain Ash (*Pyrus*) p.202
 71. Lateral buds small, cut twig exuding watery, resinous juice; fruit small, whitish drupes; a shrub growing in swamps. Poison Sumach (*Rhus vernix*) p.242
 72. Leaf-scars deeply V-shaped, almost entirely surrounding the buds 73
 72. Leaf-scars, inversely triangular to heart-shaped, large, not more than half surrounding the bud; twigs stout; pith chocolate-brown. Allantus (*Allantus glandulosa*) p.233
 73. Pith yellowish-brown; twigs stout, exuding a milky juice when cut. Sumach (*Rhus*) 153
 73. Pith whitish; twigs slender, without milky juice. Yellow Wood (*Cladrastis lutea*) p.234
 74. Terminal buds on rapidly grown shoots absent, but leaving a terminal scar 83
 74. Terminal buds present 75
 75. Lateral buds flattened, appressed, about as broad as long 76
 75. Lateral buds not distinctly flattened and appressed, in most cases longer than broad 78
 76. Terminal bud large, generally 12 mm. or more long; some of the lateral buds generally long, nearly equalling terminal bud; leaf-scars raised on dark red, polished ridges of the bark. Mountain Ash (*Pyrus*) p.202
 76. Terminal bud smaller, generally under 8 mm. long; all lateral buds small; leaf-scars not on specially colored ridges of the bark 77
 77. Tree with bushy habit of growth; twigs with characteristic licorice-like taste, generally reddish-brown, more or less pale-woolly at least toward apex; lateral buds blunt, more or less pale-woolly. Apple (*Pyrus malus*) p.200
 77. Tree with upright habit of growth, twigs without characteristic taste, generally yellowish-green and generally smooth; lateral buds sharp-pointed, smooth or sometimes slightly downy. Pear (*Pyrus communis*) p.198
 78. Buds spherical or nearly so, seldom pointed; bud-scales thick, shining; leaf-scars narrow; twigs more or less zigzag, branchlets generally thorny; fruit a small pome; small trees or shrubs. Hawthorn (*Crataegus*) p.208
 78. Buds not spherical; bud-scales thinner 79
 79. Leaf-scars narrow crescent-shaped, generally several times as broad as high 80
 79. Leaf-scars semicircular to broadly crescent-shaped, seldom as much as 3 times as broad as high 81
 80. Buds long, narrow, elliptical, 3-4 times as long as wide. Shad Bush (*Amelanchier canadensis*) p.206
 80. Buds conical, stout. Pear (*Pyrus communis*) p.198
 81. Twigs densely speckled with very minute pale dots, brightly colored, generally green-yellow below and more or less reddish above and highly polished; buds generally densely downy at least toward apex; collateral buds usually present. Peach (*Prunus persica*) p.220
 81. Twigs not densely speckled with minute dots; buds not densely downy, collateral buds generally not present 82
 82. Twigs without bitter taste; branchlets generally becoming corky-ridged; bud-scales downy-margined; leaf-scars large with conspicuous bundle-scars; fruit a spherical bur-like head generally present in winter. Sweet Gum (*Liquidambar styraciflua*) p.194
 82. Twigs with bitter taste often resembling bitter almonds; branches without corky ridges; bud-scales not downy-margined; fruit a drupe Cherry or Plum (*Prunus*) 145

83. Buds spherical or nearly so; bud-scales thick, shining; twigs more or less zigzag, often thorny; fruit a small pome. Hawthorn (*Crataegus*) p.208
 83. Buds not spherical, longer than broad 84
 84. Twigs generally gray-woolly toward apex; buds blunt, brown-hairy at tip; stipule-scars at the sides of leaf-scar. Quince (*Cydonia vulgaris*) p.204
 84. Twigs smooth or downy but not woolly; buds pointed, generally smooth or somewhat downy; stipule-scars more or less behind leaf-scar. Plum (*Prunus*) 150

THE PINES

Pinus.

Needle-shaped leaves in many small clusters of 5 or fewer, each cluster surrounded by a persistent or deciduous sheath and borne on a rudimentary branch which is subtended by a scale-like primary leaf; fruit a cone with woody scales, maturing at the end of the second or third season; seeds winged. The position of the resin-ducts in the leaves is a distinctive character of some value and may be observed if a thin cross section is made with a sharp knife and viewed toward the light with a hand-lens. Twig photographs are about $\frac{1}{4}$ natural size.

85. 5 needles in a cluster. White Pine (*Pinus strobus*) p.58
 85. Fewer than 5 needles in a cluster 86
 86. 3 needles in a cluster. Pitch Pine (*Pinus rigida*) p.60
 86. 2 needles in a cluster 87
 87. Needles 2-6 in. long, cones at right angles to branch 88
 87. Needles $\frac{1}{2}$ -3 $\frac{1}{2}$ in. long, cones pointing either backward or forward 89
 88. Twigs reddish-brown, leaves slender and flexible, resin-ducts peripheral; native species. Red Pine (*Pinus resinosa*) p.64
 88. Twigs yellowish-brown, leaves thicker and stiff, resin-ducts between periphery and bundle; European species. Austrian Pine (*Pinus laricio*, var. *austriaca*) p.66
 89. Cones pointing forward, leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, dark yellowish-green, resin-ducts between periphery and bundle; native species. Jack Pine (*Pinus Banksiana*) p.62
 89. Cones pointing backward, leaves $1\frac{1}{2}$ -3 $\frac{1}{2}$ in. long, bluish-green, resin-ducts peripheral; European species. Scotch Pine (*Pinus sylvestris*) p.68

THE LARCHES

Larix.

Pyramidal deciduous-leaved cone-bearing trees; twigs with resinous taste; rapidly-grown shoots with numerous scattered strongly decurrent leaf-scars with single bundle-scars; short stout wart-like branches with densely clustered leaf-scars abundant.

90. Cones $\frac{1}{2}$ - $\frac{3}{4}$ inch long with few scales; twigs pale reddish-brown; a native tree growing in swamps. American Larch (*Larix laricina*) p.70
 90. Cones 1 inch or more long with many scales; twigs yellowish, stouter; a European tree. European Larch (*Larix decidua*) under Comparisons p.70

THE SPRUCES

Picea.

Evergreen pyramidal trees with scaly bark, alternate scattered, 4-angled leaves without proper leaf-stalks but perched on persistent decurrent projections from the bark and ovate to cylindrical pendant cones which fall off the tree entire. The Spruces are distinguished from the Balsam Fir by the 4-sided scattered leaves, the projecting leaf-scars and the scaly bark. Twig photographs are about $\frac{1}{2}$ natural size.

91. Twigs hairy 92
 91. Twigs smooth or nearly so, cones cylindrical 94
92. Cones cylindrical, more than 3 inches long; cultivated species
 Norway Spruce (*Picea abies*) p.80
92. Cones ovate to oblong, less than 3 inches long 93
93. Leaves dark yellowish green, $\frac{1}{4}$ - $\frac{1}{2}$ inch long. Cones ovate-oblong
 $1\frac{1}{4}$ -2 inches long; a tree growing on uplands, rarely in wet places,
 reaching 40 ft. or more in height. Red Spruce (*Picea rubra*) p.74
93. Leaves bluish green, $\frac{1}{4}$ - $\frac{1}{2}$ inch long, cones ovate, $\frac{1}{4}$ - $1\frac{1}{4}$ inches
 long, persistent on tree for more than a year; a tree growing
 chiefly in swamps or lowlands, generally under 30 ft. in height,
 sometimes fruiting when less than 5 ft. high. Black Spruce (*Picea mariana*) p.76
94. Leaves green, cones 4-7 inches long, cultivated species.
 Norway Spruce (*Picea abies*) p.80
94. Leaves bluish green or silvery 95
95. Cones $2\frac{1}{4}$ -4 inches long, cone scales distinctly longer than broad
 with narrowed, ragged, blunt apex; cultivated western species.
 Blue Spruce (*Picea Menziesii*) p.78
95. Cones $1\frac{1}{4}$ -2 inches long, cone scales rounded, not ragged; leaves
 generally with unpleasant odor, native in northern New England
 but cultivated further south. White Spruce (*Picea canadensis*) p.72

THE POPLARS

Populus.

Rapidly growing trees generally with erect more or less continuous trunk forming distinct whorls of branches at top of each year's growth by which the age of the tree may be estimated; branchlets brittle easily separating at point of attachment; young bark smooth, generally light colored; pith, 5-pointed star-shaped, upon drying generally turning brown or black; leaf-scars large, 3-lobed, inverted triangular, covered with a light colored corky layer; stipule-scars generally distinct, narrow; bundle-scars 3, simple or compound in 3 groups; buds with the first scale anterior (facing outward), the first pair of scales small and opposite; scale-scars marking annual growth persisting for several years; seeds downy, produced from catkins in spring, the tree often spreading widely by formation of root suckers. The Poplars are dioecious. They resemble the Willows but are easily distinguished by the numerous scales to the bud. In addition to the native species here described a rare form, the Downy Poplar [*Populus heterophylla* L.], occurs locally in swamps in southern New England.

96. Twigs covered at least at apex with white cottony felt which may
 be readily rubbed off exposing the greenish bark below.
 Silver Poplar (*Populus alba*) p.109
96. Twigs smooth, not at all covered with white felt 97
97. Twigs yellowish 98
97. Twigs not yellowish (generally reddish-brown) 99
98. Lateral buds for the most part divergent, large, about 10 mm. or
 more in length, tree with more or less pyramidal head, but not
 narrowly spire-shaped. Carolina Poplar (*Populus deltoides*) p.108
98. Lateral buds for the most part appressed, smaller, generally under
 8 mm. long, tree narrowly spire-shaped.
 Lombardy Poplar (*Populus nigra*, var. *italica*) p.110
99. Buds more or less pale dusty-downy.
 Large-toothed Aspen (*Populus grandidentata*) p.104
99. Buds not downy 100
100. Buds large, over 15 mm. long, covered with fragrant sticky gum.
 Balsam Poplar (*Populus balsamifera*) p.106
100. Buds small, under 10 mm. long, shiny, slightly sticky but not
 fragrant. Small-toothed Aspen (*Populus tremuloides*) p.102

THE HICKORIES

Carya.

Trees with smooth gray tough bark in young trees, becoming roughened with age; twigs in the main stout, tough, flexible, but with difficulty broken, dark, sharply outlined against the sky; buds more or less naked to evidently scaly, frequently superposed, the lateral sometimes enclosed in a sac soon splitting at the top and often stalked; leaf-scars alternate, more than 2-ranked, large, conspicuous, more or less 3-lobed inversely triangular; bundle-scars conspicuous, more than 3, irregularly scattered or collected in 3 more or less regular groups, rarely in a straight line; pith not chambered except at nodes, sometimes somewhat star-shaped in cross section; lenticels oblong, conspicuous; fruit an unsculptured nut, inclosed in a husk which splits into four valves at least at the apex.

101. Buds conspicuously bright yellow with minute glandular dots;
 terminal buds elongated, flattened; bud-scales 4-6, valvate in
 pairs. Bitternut (*Carya cordiformis*) p.122
101. Buds not conspicuously bright yellow-dotted; terminal buds ovate;
 bud-scales, 10 or more, overlapping, or the outermost on lateral
 buds usually forming a closed sac soon splitting from the top;
 inner scales hairy. 102
102. Buds small, terminal buds 5-10 mm. long, their outer darker scales
 generally somewhat glandular dotted, but not conspicuously
 yellow; outer scales often falling and exposing downy scales
 beneath; twigs smooth, comparatively slender; bark not at all or
 but slightly shaggy. Pignut (*Carya glabra*) p.120
102. Buds large, the terminal buds 8-15 mm. long, ovate, nearly or quite
 glandless; twigs stout, often downy toward tip 103
103. Bark not shaggy; terminal buds broadly ovate to spherical, outer
 scales soon falling off entire, exposing pale yellowish-gray silky
 scales beneath. Mockernut (*Carya alba*) p.118
103. Bark distinctly shaggy; terminal buds elongated ovate, dark
 outer scales persisting through winter but shagging off in pieces
 from their apex downward. Shag-bark Hickory (*Carya ovata*) p.116

THE BIRCHES

Betula.

Bark smooth, in some species peeling into papery layers but not flaky; lenticels becoming conspicuously horizontally elongated with age; leaf-scars alternate, 2-ranked, semi-oval to crescent-shaped; stipule-scars narrow, often inconspicuous; bundle-scars 3 rather inconspicuous; fruit a flat seed-like body borne in catkins, staminate catkins generally present on the tree in winter.

104. Bark close, not easily separated into thin papery layers 105
104. Bark easily separated into thin papery layers and generally peel-
 ing spontaneously 106
105. Bark dark reddish brown; twigs with strong wintergreen taste.
 Black Birch (*Betula lenta*) p.128
105. Bark chalky-white; twigs without wintergreen taste, generally
 roughened with resinous dots. Gray Birch (*Betula populifolia*) p.134
106. Outer layers of bark chalky-white 107
106. Outer layers of bark not chalky-white 108
107. Native species. Paper Birch (*Betula alba*, var. *papyrifera*) p.130
107. European species. European White Birch (*Betula alba*) p.138
108. Bark reddish-brown to light pink; rare and local in New Hamp-
 shire and Massachusetts, occasionally cultivated.
 Red Birch (*Betula nigra*) p.132
108. Bark dirty-yellow; common throughout New England.
 Yellow Birch (*Betula lutea*) p.130

THE OAKS

Quercus.

The Oaks form a large genus, of which 52 are North American. Of these, 12 are native to New England. Buds clustered at ends of twigs, more or less 5-sided pyramidal, covered with 5 rows of closely overlapping brownish scales. Leaf-scars concave to rounded above, rounded at base, generally broader than high and raised with a ridge more or less well marked, decurrent from lower edge, the ridges from the 5 ranks of leaf-scars causing twig to be more or less 5-angled especially when dried. Bundle-scars irregularly scattered, inconspicuous. Stipule-scars inconspicuous. Pith of cut twig 5-pointed, star-shaped. Cross section of branch or trunk showing layers of large, porous spring wood alternating with dense layers of summer wood. Medullary rays of wood very prominent, showing as radial lines in cross section of a log, also generally showing prominently, especially through a hand-lens, on cut end of stout branchlet of several years' growth. Fruit an acorn inclosed in a scaly cup. Dead leaves often persistent on the tree during winter.

Key to Oaks based upon fruiting material.

109. Fruit maturing in autumn of second year, ripe acorns therefore borne upon parts of twig two years old; immature acorns to be found in winter on twigs of the past season's growth; shell of nut hairy inside; abortive ovules at the top of the nut; scales of acorn-cup broad and thin; lobes of leaves bristle-pointed. Black Oaks 110
109. Fruit maturing in one year, ripe acorns therefore borne upon past season's growth; no immature acorns to be found upon twigs in winter; shell of nut smooth inside; abortive ovules at base of nut; lower scales at least of acorn cup more or less thickened at base giving a knobby appearance to surface of cup; scales more or less densely woolly; kernel commonly sweetish; lobes of leaves not bristle-pointed; bark flaky except in Chestnut Oak. White Oaks 114
110. Cup of acorn shallow saucer-shaped 111
110. Cup top-shaped 112
111. Cup thin, 15 mm. or less wide; buds 4 mm. or less long. Pin Oak (*Quercus palustris*) p.162
111. Cup thick, 20 mm. or more wide; buds over 4 mm. long. Red Oak (*Quercus rubra*) p.160
112. Buds under 4 mm. long; twigs slender; shrubs. Bear Oak (*Quercus ilicifolia*) p.168
112. Buds over 4.5 mm. long; twigs rather stout; trees 113
113. Upper scales of cup loosely overlapping; buds pointed, whole surface woolly; inner bark yellow. Black Oak (*Quercus velutina*) p.160
113. Upper scales of cup closely overlapping; buds blunt, downy above middle; inner bark pale red. Scarlet Oak (*Quercus coccinea*) p.164
114. Upper scales of cup with thread-like outgrowths forming a fringe to cup; branchlets often with corky ridges; lateral buds frequently appressed. Bur Oak (*Quercus macrocarpa*) p.150
114. Cup without distinct fringe; branchlets without corky ridges; lateral buds divergent 116
115. Bark on branchlets peeling back in dark stiff-papery layers; marginal scales of cup narrow awn-pointed; acorns long-stalked. Swamp White Oak (*Quercus bicolor*) p.152
115. Bark on branchlets not peeling back in dark stiff-papery layers; acorns sessile or short-stalked (at times long-stalked in White Oak) 116
116. Buds sharp-pointed 117
116. Buds blunt 118

117. Nut 20-35 mm. long; buds 4-10 mm. long; bark thick, furrowed, not flaky. Chestnut Oak (*Quercus prinus*) p.158
117. Nut 15-20 mm. long; buds 3-6 mm. long; bark thin, flaky. Chinquapin Oak (*Quercus Muhlenbergii*) p.154
118. Twigs slender, generally not over 2 mm. thick; shrubs. Dwarf Chinquapin Oak (*Quercus prinoides*) p.156
118. Twigs relatively stout, generally over 2 mm. thick; trees 119
119. Twigs, at least in part, covered with very fine close olive-green down; buds, generally nearly hemispherical, about as broad as long; scales of cup only slightly knobby, apex of nut generally downy. Post Oak (*Quercus stellata*) p.148
119. Twigs smooth; buds distinctly longer than broad, broadly ovate; scales of cup thick-knobby at base, apex of nut generally smooth; White Oak (*Quercus alba*) p.146

Key to Oaks without fruit.

- NOTE. (W) after name indicates that the tree belongs to the White Oak Group.
- (B) after name indicates that the tree belongs to the Black Oak Group.
- Immature acorns therefore may often be found on winter twigs of species marked with (B) but not on those marked with (W).
120. Buds large, those at tip of twig 4.5 mm. or more long 121
120. Buds smaller, less than 4.5 mm. long 128
121. Bark of trunk flaky 122
121. Bark of trunk not flaky 125
122. Lateral buds generally appressed, buds downy; older twigs often with corky ridges. Bur Oak (W) (*Quercus macrocarpa*) p.150
122. Lateral buds divergent, buds smooth; twigs without corky ridges 123
123. Buds narrow conical, pointed. Chinquapin Oak (W) (*Quercus Muhlenbergii*) p.154
123. Buds shorter, blunt 124
124. Twigs at least in part covered with very fine close orange-brown down. Post Oak (W) (*Quercus stellata*) p.148
124. Twigs smooth. White Oak (W) (*Quercus alba*) p.146
125. Surface of buds pale-woolly 126
125. Surface of buds not woolly 128
126. Inner bark of trunk orange-yellow; twigs bitter, coloring saliva yellow when chewed; whole surface of bud woolly; buds large, ovate-conical. Black Oak (B) (*Quercus velutina*) p.160
126. Inner bark of trunk not yellow; twigs neither bitter nor coloring saliva when chewed; not more than upper half of bud woolly 127
127. Buds sharp-pointed; ovate, the widest part about $\frac{1}{4}$ - $\frac{1}{2}$ above base; slightly or not at all woolly toward apex. Red Oak (B) (*Quercus rubra*) p.160
127. Buds blunt-pointed; oval-ovate, the widest part at or slightly below middle; distinctly woolly above middle. Scarlet Oak (B) (*Quercus coccinea*) p.164
128. Fissures of bark separated by long flat ridges; buds ovate, more or less constricted at base; twigs not bitter. Red Oak (B) (*Quercus rubra*) p.160
128. Fissures of bark separated by long rounded ridges; buds narrower, conical, seldom constricted at base; twigs more or less bitter when chewed. Chestnut Oak (W) (*Quercus prinus*) p.158
129. Buds narrow, conical 130
129. Buds short, blunt 133
130. Bark of trunk flaky 131
130. Bark of trunk not flaky 132

131. Buds downy, lateral buds generally appressed; older twigs often with corky ridges. Bur Oak (W) (*Quercus macrocarpa*) p.150
131. Buds smooth, lateral buds divergent, twigs without corky ridges. Chinquapin Oak (W) (*Quercus Muhlenbergii*) p.154
132. Twigs of past season dull, finely downy; shrubs. Bear Oak (B) (*Quercus ilicifolia*) p.168
132. Twigs smooth, shining; slender pin-like twigs numerous, arising at nearly a right angle with the branchlets; trees. Pin Oak (B) (*Quercus palustris*) p.162
133. Bark on branchlets peeling into long, dark, stiff-papery layers. Swamp White Oak (W) (*Quercus bicolor*) p.152
133. Bark on branchlets not peeling into long, dark, stiff-papery layers. 134
134. Twigs slender, generally not over 2 mm. thick; shrubs 135
134. Twigs stout, generally over 2 mm. thick; trees 136
135. Bark of trunk smooth; young acorns generally found on winter twigs; buds more generally conical. Bear Oak (B) (*Quercus ilicifolia*) p.168
135. Bark of trunk flaky; young acorns never found on winter twigs. Dwarf Chinquapin Oak (W) (*Quercus prinoides*) p.150
136. Lateral buds generally appressed; buds densely downy; older twigs often with corky ridges. Bur Oak (W) (*Quercus macrocarpa*) p.150
136. Lateral buds divergent; buds not densely downy; twigs without corky ridges 137
137. Twigs at least in part covered with very fine close orange-brown down; buds generally nearly hemispherical and about as broad as long. Post Oak (W) (*Quercus stellata*) p.148
137. Twigs smooth; buds broadly ovate, distinctly longer than broad. White Oak (W) (*Quercus alba*) p.146

THE ELMS

Ulmus.

Leaf-scars alternate, 2-ranked, semicircular, small, but conspicuous, covered with a light corky layer; bundle-scars prominent, 3 to several, sunken; terminal bud absent, lateral buds medium-sized with 2 ranks of overlapping bud-scales; twigs slender; bark ridged; fruit small, flat, winged, ripening in spring.

138. Twigs gray and rough and strongly mucilaginous if chewed; tips of buds conspicuous with long rusty hairs. Slippery Elm (*Ulmus fulva*) p.170
138. Twigs neither gray and rough nor strongly mucilaginous; buds without long rusty hairs 139
139. Buds chestnut brown; bud-scales with darker margins; bark ridged; native species 140
139. Buds smoky brown to almost black; bud-scales nearly uniform in color, bark firmer, roughened into dark oblong blocks; trunk mostly continuous into crown with stout limbs arising at a broad angle; head "Oak-like"; European species. English Elm (*Ulmus campestris*) p.172
140. Twigs often with corky ridges; trunk generally continuous into crown with stiff dependent lower branches; head narrow, "Hickory-like." Cork Elm (*Ulmus racemosa*) p.170
140. Twigs without corky ridges; trunk dividing into several limbs, spreading gradually upward and gracefully recurving; head broad, "Elm-like." White Elm (*Ulmus americana*) p.174

THE MULBERRIES

Morus.

Leaf-scars alternate, 2-ranked, nearly circular; stipule-scars narrow; bundle-scars projecting in a closed ring or irregularly scattered; terminal bud absent; bud-scales 2-ranked; twigs with milky juice.

141. Buds about as broad as long, more or less flattened and appressed, generally under 4 mm. long; bud-scales reddish brown without darker margins. White Mulberry (*Morus alba*) p.182
141. Buds longer than broad, not at all or but slightly flattened, divergent, generally over 5 mm. long; bud-scales greenish brown with darker margins. Red Mulberry (*Morus rubra*) p.180

THE MAGNOLIAS

Magnolia.

Terminal bud much larger than lateral buds; bud-scales valvate, united in pairs to form a cap, corresponding to stipules, each pair enclosing in succession an erect folded leaf connected with the next inner pair of scales; the unmatured leaf which belongs to the outer pair of stipular scales falling off in autumn and leaving a scar on side of bud with a decurrent ridge below, representing its leaf stalk; stipule-scar narrow, encircling the twig; leaf-scars alternate, more than 2-ranked, broad, oval to narrow crescent-shaped, bundle-scars numerous, irregularly scattered or in a double row; twigs aromatic; fruit a cone made up of numerous follicles which split open in the autumn and let out the large flattish seeds.

142. Buds large, 25-50 mm. long; twigs stout; leaf-scars large 143
142. Buds small, 10-20 mm. long; twigs slender; leaf-scars small ... 144
143. Buds densely pale-downy; twigs light yellowish to bluish-green, more or less downy, fruit nearly spherical. Large-leaved Magnolia, Large-leaved Cucumber Tree, Large-leaved Umbrella Tree. (*Magnolia macrophylla* Michx.) under Comparisons p.184
143. Buds smooth; twigs brown; fruit elongated. Umbrella Tree (*Magnolia tripetala*) p.186
144. Twigs brown; leaf-scars narrow, crescent to U-shaped; buds blunt, densely downy; bark flaky; a tree; in New England found only in cultivation. Cucumber Tree (*Magnolia acuminata*) p.184
144. Twigs and buds bright green; leaf-scars oval to broadly crescent-shaped; buds pointed, with long, silky hairs, often nearly smooth; pith with more or less distinct transverse woody partitions in the ground mass; bark smooth; in New England usually a shrub, growing wild in deep swamps in Eastern Massachusetts, also extensively cultivated. Sweet Bay, Swamp Bay, Laurel Magnolia, Beaver Tree. (*Magnolia virginiana* L.; *M. glauca* L.) under Comparisons p.184

THE CHERRIES, PLUMS AND PEACH

Prunus.

Leaf-scars alternate, more than 2-ranked; bundle-scars 3; stipule-scars present, inconspicuous, or absent; buds with scales overlapping in several rows; terminal bud present or absent; fruit a drupe.

145. Terminal bud present 146
145. Terminal bud absent (Plums) 151
146. Twigs densely speckled with very minute pale dots, brightly colored, generally green-yellow below and more or less reddish above and highly polished; buds generally densely downy at least toward apex; collateral buds usually present. Peach (*Prunus persica*) p.226
146. Twigs not densely speckled with very minute dots; buds not densely downy; collateral buds absent (occasionally present in Wild Red Cherry) 147
147. Buds clustered at tips of all shoots; twigs under 2 mm. thick. Wild Red Cherry (*Prunus pennsylvanica*) p.214
147. Buds not clustered, or clustered only on short fruit spurs; twigs generally over 2.5 mm. thick 148
148. Short stout slow-growing fruit spurs present with buds clustered at their tips; European species 149
148. Short fruit spurs absent; native species 150

149. Habit erect, generally with a central leader. Sweet Cherry (*Prunus avium*) p.216
149. Habit spreading, without central leader; buds smaller; twigs more slender. Sour Cherry (*Prunus cerasus*) p.218
150. Bud-scales gray-margined; buds generally over 5 mm. long; bark smooth; generally only a shrub. Choke Cherry (*Prunus virginiana*) p.212
150. Bud-scales uniform in color; buds generally under 5 mm. long; bark becoming rough-scaly; a small to large tree. Wild Black Cherry (*Prunus serotina*) p.210
161. Native species, growing wild 152
161. Cultivated species. Varieties chiefly of the American, European, or Japanese type of Plum p.223
152. Buds generally under 4 mm. long. American Wild Plum (*Prunus americana*) p.223
152. Buds generally over 4 mm. long. Canada Plum (*Prunus nigra*) p.220

THE SUMACHS

Rhus.

Shrubs or small trees with pithy twigs and milky or watery juice; leaf-scars alternate, more than 2-ranked; bundle-scars numerous scattered or in a single curved line; stipule-scars absent; terminal bud present or absent; fruit a small drupe borne on erect or drooping clusters.

153. Terminal bud present; fruit smooth white in loose drooping clusters. Poison Sumach (*Rhus vernia*) p.242
153. Terminal bud absent; fruit more or less hairy, red, in dense erect clusters 154
154. Leaf-scars narrow, V-shaped, nearly encircling the buds; cut twig showing milky juice 155
154. Leaf-scars broader; inversely triangular to broadly crescent-shaped; twig with watery juice and resinous taste. Dwarf Sumach (*Rhus copallina*) under Comparisons p.240
155. Twigs densely hairy. Staghorn Sumach (*Rhus typhina*) p.240
155. Twigs smooth. Smooth Sumach (*Rhus glabra*) under Comparisons p.240

THE MAPLES

Acer.

Leaf-scars opposite, narrow U or V-shaped; bundle-scars conspicuous, equidistant, typically 3, though sometimes each of these becomes compounded; fruit winged, in pairs.

156. Conspicuous, narrow tooth present between leaf-scars 157
156. Conspicuous tooth absent from between leaf-scars 159
157. Buds white-downy, collateral buds generally present, twigs generally with a bloom. Box Elder (*Acer negundo*) p.200
157. Buds smooth, collateral buds never present, twigs without bloom 158
158. Buds with only one pair of scales visible, older branchlets white-streaked. Striped Maple (*Acer pennsylvanicum*) p.240
158. Buds with several pairs of scales visible, branchlets not white-streaked. Norway Maple (*Acer platanoides*) p.256
159. Outer single pair of bud-scales equalling the bud in length, their edges meeting and enclosing the bud, therefore generally only one pair of scales visible; pith brown; shrubs or at the most small trees. 160
159. Outer pair of scales shorter than bud, their edges not meeting, therefore several pairs of scales visible; trees 161
160. Buds and twigs stout, smooth; young bark with longitudinal white lines. Striped Maple (*Acer pennsylvanicum*) p.240
160. Buds and twigs more slender, both buds and twigs (at least toward tip) white-downy, white lines absent from bark. Mountain Maple (*Acer spicatum*) p.248

161. Buds brown, narrow, sharp-pointed, generally 4-8 pairs of closely overlapping scales visible, collateral buds absent. Sugar Maple (*Acer saccharum*) p.250
161. Buds red or green, broader, blunt-pointed, fewer scales visible 162
162. Terminal buds small, red, generally under 5 mm. long and not distinctly larger than lateral buds; collateral buds generally present; pith often pink; native trees 163
162. Terminal buds large, stout, generally over 5 mm. long and generally distinctly larger than lateral buds; collateral buds never present; European trees 164
163. Broken twigs with rank odor, bark falling away in large, thin flakes on old trees, branchlets strongly tending to grow downward and curve upward at their tips. Silver Maple (*Acer saccharinum*) p.252
163. Broken twigs without rank odor, bark rough on old trees but generally not flaking in large thin scales, branchlets less markedly curved. Red Maple (*Acer rubrum*) p.254
164. Buds red, inner scales covered with rusty wool; adjacent edges of leaf-scars meeting and forming a slight projection; bark close-ridged, not flaky. Norway Maple (*Acer platanoides*) p.256
164. Buds green, inner scales white-woolly, edges of leaf-scars not meeting; bark flaking off in squarish scales. Sycamore Maple (*Acer pseudo-platanus*) p.258

THE ASHES

Fraxinus.

Leaf-scars opposite, large, conspicuous; bundle-scars numerous, minute, forming a curved line often more or less confluent; buds stout, scurfy, brown or black with ovate bud-scales opposite in pairs; twigs stout and brittle; fruit winged.

165. Leaf-scars deeply concave on upper margin. White Ash (*Fraxinus americana*) p.270
165. Leaf-scars not deeply concave on upper margin, semicircular to shield-shaped 166
166. Bark soft-scaly; buds generally black; last pair of leaf-scars generally some distance below end of twig giving a stalk-like appearance to the terminal bud. Black Ash (*Fraxinus nigra*) p.274
166. Bark ridged, not soft-scaly 167
167. Buds black; trees found only in cultivation. European Ash (*Fraxinus excelsior*) under Comparisons p.272
167. Buds dark brown; trees native 168
168. Twigs downy. Red Ash (*Fraxinus pennsylvanica*) p.272
168. Twigs smooth. Green Ash (*Fraxinus pennsylvanica*, var. *lancoolata*) under Comparisons p.272

GLOSSARY

Accessory buds. Buds at or near the nodes but not in the axil. Of two kinds, collateral and superposed.

Acorn. The complete fruit of an Oak consisting of a nut partially enclosed by an involucre cup.

Adjacent. Situated in close proximity.

Alternate. Scattered along the stem; said of leaves and scales in distinction from opposite.

Apex. The top, as the tip of the bud.

Appressed. Lying close against the twig, as the buds of the Shad Bush (p. 207).

Awl-shaped. Small and tapering to a slender point.

Awn. A long hair-like point.

Axil. The angle formed at the upper side of the attachment of the leaf to the stem.

Axillary. In an axil. An axillary bud is the first bud above the leaf or leaf-scar.

Bark. The outer covering of the trunk or branch. Unless otherwise specified, the heading "Bark" in the descriptions refers to the bark of the trunk.

Berry. A fruit fleshy throughout.

Bloom. The powdery waxy substance easily rubbed off, as the bloom on the twigs of the Box Elder and cabbage.

Bract. A more or less modified leaf.

Branch. A secondary division of a trunk.

Branchlet. A small branch.

Bud. An undeveloped branch or fruit cluster with or without a protective covering of scales.

Bud-scales. Reduced leaves covering a bud.

Bundle-scars. Scars of the fibro-vascular bundles which ran up through the leaf-stalk and connected with the veins of the leaf, seen as dots in the leaf-scar.

Bur. A spiny fruit, as the bur of the Chestnut (p. 145).

Buttressed. Said of the trunk when enlarged at the base as frequently is the case in the White Elm (p. 175).

Calyx. The outer portion of a flower consisting of a circle of modified leaves usually green in color.

Capsule. A dry fruit which splits at maturity to let out the seeds.

Catkin. A unisexual, elongated, compact cluster of flowers with scaly bracts usually falling away in one piece, as in the Alders (p. 141), Birches (pp. 129-139), etc.

Cell. One of the chambers of the ovary. One of the microscopic structural elements out of which plant tissues are built up.

Chambered. Said of the pith when interrupted by hollow spaces, as in the Butternut (fig. 16).

Clustered. Said of buds when several are produced near together as in the Oaks (p. 165).

Collateral buds. Accessory buds at the side of the axillary bud as in the Red Maple (fig. 17).

Concave. Curved with the upper margin depressed.

Cone. A fruit such as of the Pines with woody closely overlapping scales.

Confluent. Said of bundle-scars, when the separate scars are so close together that they appear to form a single scar.

Conical. Cone-shaped, largest at the base and tapering to the apex.

Crown. The upper mass of branches.

Cup-shaped. Shaped like a cup; deeper than saucer-shaped.

Deciduous. Falling away; said of trees that drop their leaves before winter.

Decurrent. Said of ridges that run down from the leaf-scar.

Deliquescent. Said of a tree with broad spreading habit as the Apple (p. 201).

Diocious. Said of plants such as the Willows and Poplars that have separate male and female individuals.

Divergent. Said of buds that point away from the twig as in the Carolina Poplar (fig. 15).

Downy. Covered with fine hairs.

Drupe. A stone-fruit as in the Cherries with the seed enclosed in a stone or pit which is surrounded by a fleshy portion.

Egg-shaped. Shaped like an egg with the broadest part below the middle.

Elliptical. Oblong with regularly rounded ends.

Entire. Margin without indentations.

Epidermis. The outermost layer of cells.

Escape. A plant originally cultivated but now growing like a wild plant.

Evergreen. With green leaves in winter, as the Pines and Holly.

Excurrent. Said of a tree of erect habit of growth, such as the Spruce (p. 78) or Poplar (p. 109).

Fan-shaped. Shaped like an expanded fan.

Fibro-vascular bundles. The strands containing the elements for the transportation of fluids through the plant. They ultimately connect with the veins of the leaves.

Flaky (bark). With loose scales easily rubbed off.

Flower bud. A bud containing an undeveloped flower or flower cluster.

Fluted. With rounded ridges.

Follicle. A pod which opens along one side only.

Fruit. The part of a plant containing the seeds.

Gland. A small protuberance, as on the leaves of the Arbor Vitae (p. 91).

Glandular. Provided with glands.

Habit. The general appearance of the tree as seen at a distance.

Habitat. The place where the tree naturally grows, such as swamps or sandy plains.

Hairy. With long hairs.

- Head.* The upper portion of a tree.
- Heartwood.* The dead central portion of the trunk.
- Hoary.* Grayish-white with a fine close down.
- Hybrid.* A cross between two species or varieties.
- Internode.* The portion of the stem between two nodes.
- Inversely triangular.* Inverted triangular with the apex below.
- Involucre.* The bracts surrounding the flower cluster.
- Juvenile.* Youthful, said of the leaves formed in the early stages of development.
- Keeled.* With a central ridge like the keel of a boat.
- Key.* A winged fruit.
- Lanceolate.* Lance-shaped; similar to ovate but narrower with outline tapering gradually to the apex.
- Lateral bud.* A bud produced on the side of a twig.
- Leaf bud.* A bud containing undeveloped leaves but not flowers.
- Leaf-scar.* The scar left by the fall of the leaf.
- Leaf-stalk.* The stem of a leaf.
- Lenticels.* Corky spots on the surface which admit air to the interior of the twig.
- Limbs.* The larger branches.
- Linear.* Long and narrow, several times as long as broad with parallel edges, as the leaves of the Pines.
- Lobed.* With rounded indentations running $\frac{1}{2}$ to $\frac{3}{4}$ the way from the margin inward.
- Longitudinal.* Lengthwise.
- Medullary rays.* Rays of tissue extending from the pith toward the bark, best seen in cross section.
- Midrib.* The central vein of a leaf.
- Mucilaginous.* Slimy when chewed.
- Naked bud.* A bud without bud-scales.
- Needle.* A narrow leaf as in the Pines.
- Node.* The place on the twig at which one or more leaves were produced.
- Nut.* A large hard fruit as in Hickory, Oak and Chestnut.
- Nutlet.* A small nut.
- Oblanceolate.* Inverted lanceolate.
- Oblong.* Two or three times longer than broad with about uniform diameter.
- Obovate.* Inverted ovate.
- Opposite (leaves and leaf-scars).* With two leaves or leaf-scars opposed at a node.
- Oval.* Broadly elliptical.
- Ovary.* The part of the pistil producing the seeds.

- Ovate.* Egg-shaped, with the broadest part below the middle.
- Peripheral.* Situated near the margin.
- Persistent.* Remaining on the tree.
- Pistil.* The seed-bearing portion of the flower.
- Pith.* The softer central portion of a twig.
- Pod.* A dry fruit which splits open at maturity.
- Pome.* A fruit like the Apple or Pear.
- Pungent.* Sharp to the taste.
- Pyramidal.* Shaped like a pyramid with broadest portion at the base.
- Raceme.* A simple cluster of stalked flowers arranged along an elongated axis.
- Resin-duct.* A tube for the conduction of resin seen in the leaves of the Pines.
- Sapwood.* The young living wood outside the heartwood.
- Saucer-shaped.* Shaped like a saucer, shallower than cup-shaped.
- Scales.* A small modified leaf seen in buds and cones. One of the flakes into which the outer bark often divides.
- Scarious.* Thin, dry and membranaceous, not green.
- Scurfy.* Covered with small bran-like scales.
- Sepal.* One of the divisions of the calyx.
- Sessile.* Without a stalk.
- Shrub.* A low woody growth, smaller than a tree and generally branching near the base.
- Smooth.* Not rough nor hairy.
- Spine.* A sharp rigid outgrowth from the stem.
- Spray.* The aggregate of smaller branches and branchlets.
- Spur.* A short, slowly-grown branchlet.
- Stamens.* The pollen-bearing portions of a flower.
- Staminate.* Having stamens; said of trees bearing only male flowers.
- Sterile.* Not producing seed.
- Stipular.* Similar in form or position to stipules.
- Stipules.* Two small leaf-like bodies located at the base of the leaf-stalk in some species.
- Stipule-scar.* The scar left by the fall of a stipule (fig. 15).
- Stomata.* Breathing pores in leaves.
- Stone-fruit.* A fruit like that of the Cherry. The same as drupe.
- Strengthening cells.* Thick-walled cells present in the leaves of some of the Pines.
- Striate.* Longitudinally streaked.
- Submerged.* Covered, as by the bark.
- Sucker.* A shoot arising from below ground.

Superposed buds. Accessory buds above the axillary bud, as in the Butter-nut (fig. 16).

Surface-sectioned. Cut parallel to and near the surface.

Teeth. Small projections along the margin.

Terminal bud. The bud formed at the tip of a twig.

Thorn. A stiff, woody, sharp-pointed projection.

Top-shaped. Shaped like a top with the broadest part above.

Tree. A woody plant, larger than a shrub, from which it cannot always be distinguished. Usually defined as a woody growth, unbranched near the base and reaching a height of at least fifteen feet.

Triangular. Shaped like a triangle with the base below.

Trunk. The main stem of a tree.

Twig. A young shoot. Unless otherwise specified, used in the descriptions to denote the growth of the past season only.

Type. A term used to designate the characteristic form of a species in distinction from its varieties.

Valvate. Said of buds in which the scales meet without overlapping.

Whorl. A cluster of three or more leaves or leaf-scars at a single node.

Wing. A thin flat appendage.

Woolly. Covered with tangled or matted hairs resembling wool.

INDEX

Where the species receives its most extended description, the page number appears in boldface type. Where the species is otherwise mentioned, the page number is printed in ordinary type. Synonyms of both common and scientific names are printed in *italics* and their page numbers in ordinary type.

<i>Abele</i>	100	<i>Amygdalus persica</i>	226
<i>Abies balsamea</i>	84	<i>Apple</i>	20, 32,
<i>Acacia</i>	236	36, 180, 182, 198, 200, 204, 262	
<i>Three-thorned</i>	230	<i>Apple, Thorn</i>	208
<i>Acer</i>	56	<i>Arbor Vitae</i>	90
<i>barbatum</i>	250	Art:	
<i>dasycarpum</i>	252	Tree study in relation to	13
Key to Species	56	<i>Ash</i>	13, 38, 40, 41, 57, 270
<i>negundo</i>	260	American Mountain	202
<i>pennsylvanicum</i>	246	<i>Basket</i>	274
<i>platanoides</i>	256	Black	36, 270, 272, 274
<i>pseudo-platanus</i>	258	Brown	272, 274
<i>rubrum</i>	254	European	13, 272
<i>saccharinum</i>	250	European Mountain	202
<i>saccharum</i>	252	Green	272
<i>saccharum</i>	250	<i>Hoop</i>	173, 274
var. <i>nigrum</i>	250	Key to Species	57
<i>spicatum</i>	248	Mountain	202
<i>Aesculus:</i>		Prickly	236
<i>glabra</i>	262	Red	272
<i>Hippocastanum</i>	262	<i>River</i>	272
<i>octandra</i>	262	<i>Swamp</i>	274
<i>Allanthus</i>	228, 238	Western Mountain	222
<i>glandulosa</i>	238	White	34, 36, 40,
<i>Alder</i>	140, 192	41, 120, 188, 256, 270, 272, 274	
European Black	140	<i>Ash-leaved Maple</i>	260
<i>Hoary</i>	140	<i>Aspen</i>	102
Smooth	140	American	102
Speckled	140	Large-toothed	100, 102, 104
<i>Alligator-wood</i>	194	<i>Quaking</i>	102
<i>Alnus:</i>		Small-toothed 38, 100, 102, 104, 106	
<i>incana</i>	140	<i>Austrian Pine</i>	64, 66
<i>rugosa</i>	140	<i>Balm of Gilead</i>	106
<i>vulgaris</i>	140	<i>Fir</i>	84
<i>Alternate-leaved Dogwood</i>	202	<i>Balsam</i>	84, 106
<i>Amelanchier canadensis</i>	206	<i>Fir</i>	82, 84, 86
American:		Poplar	102, 104, 106
<i>Aspen</i>	102	Bark	83
<i>Beech</i>	142	<i>Basket Ash</i>	274
<i>Elm</i>	174	<i>Basewood</i>	264
<i>Holly</i>	244	Bay:	
Hornbeam	34, 39, 124, 126	<i>Swamp</i>	55
Larch	70	Sweet	55, 184, 186
Mountain Ash	202	<i>Bean, Indian</i>	276
Plum	220, 222	<i>Bear Oak</i>	156, 188
var. <i>Gold</i>	222		