



BOTANICAL GAZETTE

APRIL, 1901

NEW OR LITTLE KNOWN NORTH AMERICAN TREES. III.

CHARLES S. SARGENT.

✓ *Crataegus acutifolia*, n. sp.—Glabrous. Leaves oval to oblong-obovate, acute or acuminate, or rarely rounded at the apex, cuneate at the base, finely crenulate-serrate with gland-tipped teeth except toward the base, or occasionally only above the middle, on vigorous leading shoots sometimes irregularly divided toward the apex into two or three pairs of short acute lobes; nearly fully grown when the flowers open and then thin and lustrous above and at maturity thin but firm in texture, dark green and very lustrous on the upper surface, pale yellow-green on the lower surface, about $1\frac{1}{2}$ in. long and 1 in. wide, and on leading shoots sometimes $2\frac{1}{2}$ to 3 inches long and nearly 2 in. wide, with slender light yellow midribs comparatively deeply impressed above, and four or five pairs of thin primary veins without the parenchyma; petioles slender, winged above by the decurrent bases of the leaf-blades, deeply grooved, glandular with minute dark caducous glands, from $\frac{1}{4}$ to $\frac{1}{3}$ in. in length; stipules linear, elongated, dark red, caducous. Flowers $\frac{1}{2}$ in. in diameter on slender pedicels, in compound many-flowered compact corymbs; bracts and bractlets linear, glandular-serrate, caducous; calyx-tube narrowly obconic, the lobes lanceolate, acuminate, entire or occasionally obscurely glandular-serrate; stamens 10; filaments slender, elongated; anthers small; styles

2 or 3. Fruit in drooping few-fruited clusters, oblong, full and rounded at the ends, bright scarlet, marked by few large dark lenticels, about $\frac{1}{3}$ in. long; calyx-tube prominent with a broad deep cavity, the lobes closely appressed, often deciduous before the maturity of the fruit; flesh thin, yellow, dry and mealy; nutlets 2 or 3, broad, prominently ridged on the back with broad rounded ridges, about $\frac{3}{16}$ in. long.

A tree 25 to 30 ft. in height with a trunk 8 or 10 in. in diameter, and wide-spreading branches forming a broad symmetrical rather flat-topped head and slender nearly straight branchlets marked by oblong pale lenticels, dark chestnut-brown or orange-brown and lustrous during their first year, becoming dull gray-brown during their second season, and slightly armed with few slender straight chestnut-brown spines from 1 to nearly 2 in. in length.

Flowers early in May. Fruit ripens toward the end of September.

Open oak woods near the bank of the Mississippi river at Carondelet in South St. Louis, Missouri. First collected in May 1887 by *H. Eggert*, and in September 1900 by *Eggert, Norton, and Sargent*.

This is one of several forms which have been usually confounded with *Crataegus Crus-galli* of Linnaeus, but which can probably best be separated from that species. From *Crataegus Crus-galli* as limited by Linnaeus and Aiton, and now universally recognized, it differs in its thin usually acute or acuminate leaves with comparatively prominent veins, in its smaller flowers, much smaller early-ripening scarlet fruit, and in its more slender branchlets only sparingly armed with much more slender spines.

✓ *Crataegus erecta*, n. sp.—Glabrous. Leaves broadly oval to obovate, or on leading shoots nearly orbicular, acute and short-pointed at the apex, cuneate and entire at the base, finely crenulate-serrate above, or on vigorous shoots coarsely dentate with broad nearly straight gland-tipped teeth, thin, dull green and nearly fully grown when the flowers open, and at maturity thin but firm in texture, dark dull green on the upper surface, pale on the lower surface, $1\frac{1}{2}$ to 2 in. long, 1 to $1\frac{1}{4}$ in. wide, and on leading shoots sometimes 3 in. long and $2\frac{1}{2}$ in. wide, with

slender midribs and thin prominent primary veins; petioles slender, deeply grooved, wing-margined above particularly on vigorous shoots, glandular with minute dark glands, often dark red after midsummer, from $\frac{1}{4}$ to $\frac{1}{2}$ in. long; stipules linear, glandular-serrate, fading red, $\frac{1}{2}$ in. long, caducous. Flowers $\frac{1}{2}$ to $\frac{5}{8}$ in. in diameter, on slender elongated pedicels, in broad loose many-flowered very thin-branched compound corymbs; bracts and bractlets linear, glandular-serrate, caducous; calyx-tube narrowly obconic, the lobes narrow, acuminate, elongated, entire or occasionally obscurely dentate; stamens usually 10, occasionally 11 to 13; filaments slender; anthers small, pale yellow; styles 3 or 4, surrounded at the base by a narrow ring of short pale hairs. Fruit in few-fruited drooping clusters, subglobose, usually a little longer than broad, full but flattened at the ends, dark dull crimson, marked by occasional large dark lenticels, from $\frac{1}{4}$ to $\frac{1}{3}$ in. in length; calyx-tube very short with a broad shallow cavity, the lobes gradually narrowed from broad bases, closely appressed, usually persistent on the mature fruit; flesh thin, yellow, dry and mealy; nutlets 3 or 4, broad, prominently doubly ridged on the back, about $\frac{3}{16}$ in. long.

A tree usually 25 to 30 ft. in height with a trunk a foot in diameter covered with dark gray-brown or nearly black bark broken irregularly into thick plate-like scales, ascending branches forming a broad open erect head and slender slightly zigzag branchlets marked by numerous large oblong pale lenticels, green more or less tinged with red when they first appear, orange or reddish-brown during their first season and gray or gray-brown during their second year, and armed with numerous straight slender chestnut-brown spines from 1 to 2 in. in length.

Flowers about May 10. Fruit ripens toward the end of September. The leaves before falling turn dull orange-color.

Rich bottom-lands of the Mississippi river in Illinois opposite St. Louis. First noticed October 5, 1899, in a vacant lot in the city of East St. Louis by *Eggert*, *Norton*, and *Sargent*, and on May 12, 1900, collected in flower by *J. B. S. Norton*, and in October 1900 with ripe fruit by *Eggert*, *Norton*, and *Sargent*.

This is another of the *Crus-galli* group, differing from the species of Linnaeus by its thin pointed or suborbicular leaves with prominent veins, which even on vigorous shoots show no tendency to lobing, by its pale yellow not rose-colored anthers, small nearly globose bright scarlet fruit, by its ascending not wide-spreading branches, and by its less numerous spines standing out from all sides of the branchlets, as they do usually in *Crataegus* with the exception of *Crataegus Crus-galli*. This species in its typical form can always be recognized by the direction of the spines which point downward from the branch in two ranks.

Growing in a field in the Mississippi bottom near Fish lake in the village of Cahokia about four miles below East St. Louis there is a specimen of *Crataegus erecta* forty feet in height with a trunk three feet in diameter three feet above the surface of the ground and a broad head of numerous large upright branches.

✓ ***Crataegus Lettermani*, n. sp.**—Leaves obovate to broadly oval on leading shoots, acute, acuminate or rounded and short-pointed at the apex, gradually narrowed from near the middle to the base and decurrent on the stout elongated glandular tomentose but ultimately nearly glabrous petioles, often slightly and irregularly divided above into three or four pairs of short acute lobes, coarsely doubly serrate, often nearly to the base, with glandular incurved or straight teeth; as they unfold strongly plicate, tomentose above and below like the young branchlets, with a thick coat of hoary tomentum, and when the flowers open covered on the upper surface with short soft hairs and villose on the lower surface, and at maturity thin but firm in texture, scabrate and dark green above, pale below, from 2 to 2½ in. long and from 1 to 1½ in. wide, with slender midribs and primary veins impressed on the upper surface and puberulous below, and conspicuous forked secondary veins and reticulate veinlets. Flowers about ¾ in. in diameter in compact many-flowered thick-branched tomentose cymes; bracts and bractlets linear, glandular-serrate, caducous; calyx-tube narrowly obconic, coated with thick hoary tomentum, the lobes narrow, acuminate, villose, finely glandular-serrate, reflexed after anthesis; stamens 10; filaments slender, elongated; anthers small; styles 5, surrounded at the base by a broad ring of white tomentum. Fruit nearly globose and somewhat flattened at the

ends, dark red, marked by a few large pale lenticels, $\frac{5}{8}$ in. in diameter; calyx-cavity broad and shallow, the lobes serrate, villose, spreading and closely appressed; flesh thin and yellow; nutlets 5, thick, very prominently doubly ridged on the back, about $\frac{1}{4}$ in. long.

A tree from 15 to 18 ft. in height, with a trunk 6 or 8 in. in diameter, and stout wide-spreading branches forming a symmetrical round-topped head and slender branchlets dull red and puberulous during their first season and dark gray-brown during their second year, and armed with stout straight spines from $1\frac{1}{2}$ to 2 in. in length.

Flowers in May. Fruit ripens late in October.

Rich woods, Allenton and Pacific, Missouri, *George W. Letterman*, May and October 1882.

This species, which was referred by Engelmann to *Crataegus tomentosa* Linnaeus, and to *Crataegus punctata* Jacquin, is still very imperfectly known. Its relationship appears to be with *Crataegus collina* Chapman, from which it differs in its more tomentose young leaves and branchlets, in its short thick-branched and more tomentose corymbs, ten stamens, rather larger fruit, and in its much later flowers.

✓ ***Crataegus Arnoldiana*, n. sp.**—Leaves broadly ovate or rarely oval, acute at the apex, rounded, truncate or occasionally broadly cuneate at the base, irregularly divided above the middle into numerous short acute lobes, coarsely doubly glandular-serrate except at the base; in early spring densely villose above and below, and at maturity from 2 to 3 in. long and broad, membranaceous, smooth, dark green and lustrous on the upper surface, paler on the lower surface, slightly villose on the under side of the slender midribs and thin remote primary veins running to the points of the lobes and faintly impressed above; petioles slender, only slightly grooved, densely villose, ultimately puberulous, from $\frac{3}{4}$ to $1\frac{1}{2}$ in. long; stipules linear, coarsely glandular-serrate, often 1 in. long, caducous. Flowers $\frac{3}{4}$ in. in diameter on slender pedicels in broad loose compound many-flowered thin-branched tomentose cymes; bracts and bractlets lanceolate to oblanceolate, coarsely glandular-serrate;

calyx-tube broadly obconic, densely tomentose, the lobes narrow, elongated, acuminate, glandular-serrate, villose on both surfaces, reflexed after anthesis; stamens 10; filaments slender; anthers large, pale yellow; styles 3-5, usually 3 or 4, surrounded at the base by a broad ring of thick white tomentum. Fruit on slender pedicels in erect, spreading or sometimes drooping few-fruited slightly villose clusters, subglobose but rather longer than broad, bright crimson, marked by numerous large pale lenticels, villose particularly toward the ends with long white scattered hairs, $\frac{3}{4}$ in. long; calyx-cavity broad and shallow, the lobes coarsely glandular-serrate, villose, wide-spreading, often deciduous before the falling of the fruit; flesh thick, bright yellow, subacid; nutlets usually 3 or 4, thick, light-colored, prominently ridged on the back with high rounded ridges, about $\frac{1}{4}$ in. long.

A tree 15 to 20 ft. in height with a short trunk 10 or 12 in. in diameter, stout ascending branches forming a broad open irregular head, and slender strongly zigzag branchlets marked by large oblong pale lenticels, coated when they first appear with long matted hairs, becoming dark orange-brown and lustrous before midsummer and glabrous or puberulous during their first winter, light orange-brown and lustrous during their second season, and finally ashy-gray, and armed with very numerous stout straight or slightly curved bright chestnut-brown lustrous spines from $2\frac{1}{2}$ to 3 in. long and brilliant for four or five years. Winter buds oblong, gradually narrowed to the obtuse apex, bright red and lustrous, about $\frac{3}{16}$ in. long.

Flowers during the last week of May. Fruit ripens by the middle of August and falls before the 1st of September.

Known in a wild state only in a small group of plants growing on a wooded bank in the Arnold Arboretum, but now frequently cultivated in the neighborhood of Boston, and in cultivation forming a tall trunk and promising to attain a large size.

When it is covered with its brilliant and abundant fruit *Crataegus Arnoldiana* is one of the most beautiful of the thorns which ripen their fruit in summer or early autumn. From *Crataegus submollis* (Sargent, BOT. GAZ.

31:7. 1901) of the same region it differs in its broader darker green more villose leaves which are usually rounded, not cuneate, at the base, in its smaller flowers, subglobose, not oblong or pear-shaped, crimson fruit with smaller spreading calyx-lobes, borne on shorter peduncles and ripening two or three weeks earlier, and by its much more zigzag and more spiny branches which make this tree particularly noticeable in winter when it may be readily recognized from all other thorn trees. From *Crataegus Champlainensis* (Sargent, *Rhodora* 3: 20), another of the eastern species of the *mollis* group with 10 stamens, it differs in its larger thinner leaves which are yellow-green, not blue-green, in its smaller subglobose, not oblong or obovate, early-ripening fruit, the fruit of *Crataegus Champlainensis* beginning to ripen early in September and remaining on the branches until midwinter. It differs also from this northern species in the form of the fruiting calyx and in its much more zigzag branchlets.

✓ *Crataegus Arkansana*, n. sp. — Leaves oval to oblong-ovate, acute at the apex, broadly cuneate, or on vigorous leading shoots occasionally rounded at the base, usually divided above the middle into three or four pairs of short broad acute lobes, sharply serrate, sometimes to the very base, with spreading gland-tipped teeth; in early spring coated with short soft pale hairs, particularly on the under surface of the midribs and veins, and at maturity thick and leathery, dark dull green and glabrous on the upper surface, pale yellow-green on the lower surface, from 2 to 3 in. long, from $1\frac{3}{4}$ to 2 in. wide, or on vigorous shoots often 4 in. long and 3 in. broad, with stout light yellow midribs and primary veins deeply impressed above and slightly villose below with scattered pale hairs, conspicuous secondary veins and reticulate veinlets; petioles stout, deeply grooved, more or less winged above, glandular with minute usually deciduous dark glands, tomentose, ultimately glabrous or puberulous, usually dull red in the autumn, from 1 to $1\frac{1}{2}$ in. long; stipules glandular-serrate, villose, linear-lanceolate to linear-obovate, about $\frac{1}{2}$ in. in length. Flowers 1 in. in diameter in broad compound many-flowered thin-branched villose corymbs; bracts and bractlets oblong-ovate, acuminate, finely glandular-serrate; calyx-tube narrowly obconic, coated with long matted pale hairs, the lobes short, acute, very coarsely glandular-serrate, glabrous or slightly villose; stamens 20; filaments slender; anthers large,

pale yellow; styles 5. Fruit in few-fruited clusters, oblong or rarely obovate, full and rounded at the ends, bright crimson, lustrous, marked by few large dark lenticels, slightly tomentose at the ends, particularly at the apex, from $\frac{3}{4}$ to 1 in. long, $\frac{3}{4}$ in. thick; calyx-cavity deep but comparatively narrow, the lobes small, linear-lanceolate, coarsely glandular-serrate, red at the base on the upper surface, erect and persistent; flesh yellow, thick, dry, subacid; nutlets small in comparison with the size of the fruit, thin, rounded or slightly and irregularly ridged on the back, $\frac{1}{3}$ in. long.

A tree from 15 to 20 ft. in height with a tall straight stem covered with pale scaly bark, thick ascending branches and stout slightly zigzag branchlets marked by large oblong pale lenticels, dark green and covered with long scattered pale hairs when they first appear, light orange-brown and very lustrous during their first winter, becoming ashy-gray during their second year, and unarmed or armed with occasional straight bright chestnut-brown spines gradually narrowed from broad bases and usually from $\frac{1}{3}$ to $\frac{1}{2}$ in. long. Winter-buds about $\frac{1}{8}$ in. in length, nearly as broad as long, dark red, puberulous along the margins of the scales.

Flowers at the Arnold Arboretum about the middle of May. Fruit ripens at the end of October and remains on the branches for several weeks longer, falling gradually. Late in October or early in November the leaves turn bright clear yellow.

Apparently common in southern Arkansas (*B. F. Bush* 953), but first distinguished from plants in the Arnold Arboretum raised from seeds collected in 1883 by *George W. Letterman* at Newport, Ark.

From *Crataegus mollis* Scheele, with which it has been confounded, *Crataegus Arkansana* differs in the form and particularly in the leathery texture of the leaves which when young are villose, not tomentose, in its villose corymbs, its oblong late-ripening fruit, the fruit of *Crataegus mollis* falling from the middle of August to the middle of September, and in its unarmed or only slightly armed branchlets. Perfectly hardy in the Arnold Arboretum, *Crataegus Arkansana* is unsurpassed late in the autumn in the beauty of its large brilliant and abundant fruits which make it one of the most desirable garden plants of the genus.

Crataegus Texana Buckley, *Proc. Phil. Acad.* 1861:454.— Leaves broadly ovate, acute or rarely rounded at the apex, cuneate or on leading shoots truncate or slightly cordate at the base, usually divided above the middle into four or five pairs of broad acute lobes, very coarsely and doubly glandular-serrate except toward the base; when they first unfold covered above with short soft pale hairs and below with a thick coat of hoary tomentum, and at maturity thick and firm in texture, dark green and lustrous on the upper surface, pale and pubescent or tomentose on the lower surface particularly along the stout light-colored midribs and primary veins, and on the conspicuous secondary veins and reticulate veinlets, from 3 to 4 in. long, from $2\frac{1}{2}$ to 3 in. wide; petioles stout, more or less winged above, deeply grooved, tomentose, ultimately nearly glabrous, from $\frac{1}{2}$ to $\frac{3}{4}$ in. long; stipules lunate, apiculate, often stipitate, coarsely serrate, from $\frac{1}{4}$ to $\frac{1}{2}$ in. long. Flowers $\frac{3}{4}$ in. in diameter on elongated slender pedicels in broad loose many-flowered tomentose cymes; bracts and bractlets oblong to oblong-ovate, broad, acuminate, villose, sometimes $\frac{1}{2}$ in. long, very conspicuous; calyx-tube broadly obconic, coated with thick pale tomentum, the lobes gradually rounded from broad bases, acuminate, very coarsely glandular-serrate, villose with long matted hairs, reflexed after anthesis; stamens 20; filaments slender; anthers large, dark red; styles 5. Fruit in broad drooping many-fruited tomentose ultimately nearly glabrous clusters, short-oblong or somewhat obovate, full and rounded at the ends, tomentose until nearly fully grown, at maturity bright scarlet, lustrous, marked by occasional large pale lenticels, puberulous toward the apex, from $\frac{3}{4}$ to 1 in. in length; calyx-cavity broad and deep, the lobes much enlarged, glandular-serrate, villose, dark red at the base on the upper side, usually erect, often deciduous; flesh thick, yellow, sweet and edible; nutlets 5, thick, slightly grooved on the back, from $\frac{1}{3}$ to $\frac{1}{4}$ in. long.

A tree often 30 ft. in height with a tall trunk sometimes a foot in diameter covered with dark closely appressed scales, stout spreading branches forming a symmetrical round-topped

head, or on young trees upright and forming an open irregular crown, and comparatively slender slightly zigzag branchlets, dark bronze-green and villose when they first appear, soon becoming dull reddish-brown, lighter reddish-brown in their second season, and ultimately pale ashy-gray, and often unarmed, or armed with occasional slender nearly straight bright chestnut-brown spines usually about 2 in. in length.

Flowers the middle of March. Fruit ripens toward the end of October.

Rich bottom-lands, central and western Texas.

Long confounded with *Crataegus mollis* Scheele (see Gray, *Proc. Phil. Acad.* 1867: 163), it can be distinguished from that species by the shape of the thinner leaves which are nearly always cuneate and only rarely cordate at the base even on the most vigorous shoots, and are usually less deeply lobed and much more coarsely serrate, by the smaller flowers in fewer-flowered more tomentose cymes, by the late-ripening fruit, and by the color of the branchlets and their more numerous spines. *Crataegus mollis* apparently does not extend south of central Missouri and middle Tennessee, being replaced in southern Missouri and Arkansas by several forms of the *Mollis* group which are still imperfectly known.

✓ ***Crataegus pedicellata*, n. sp.**—Leaves broadly ovate, oval, or occasionally obvate or rhomboidal, acute or acuminate, broadly cuneate or rounded, and on vigorous leading shoots occasionally truncate or slightly cordate at the base, divided above the middle into four or five pairs of short acuminate lobes, coarsely and often doubly serrate, except toward the base, with spreading glandular teeth; in early spring roughened above by short rigid pale hairs and at maturity membranaceous, dark rich green and scabrate on the upper surface, pale and glaucous below, from 3 to 4 in. long, from 2 to 3 in wide, with slender midribs slightly impressed above and thin remote primary veins arching to the points of the lobes; petioles slender, only slightly grooved, villose but ultimately glabrous, obscurely glandular with minute scattered dark glands, from $1\frac{1}{2}$ to 2 in. in length; stipules of leading shoots strongly falcate, stipitate, coarsely glandular-serrate, $\frac{1}{3}$ in. long. Flowers $\frac{1}{2}$ in. in diameter on slender-elongated pedicels, in loose lax rather few-flowered slender-branched

slightly villose corymbs; bracts and bractlets laciniate, glandular-serrate, caducous; calyx-tube narrowly obconic, glabrous, the lobes broad, acute, very coarsely glandular-serrate reflexed after anthesis; stamens 10; filaments slender, elongated; anthers rose color; styles 5, surrounded at the base by a conspicuous ring of pale tomentum. Fruit in few-fruited drooping glabrous clusters, oblong, full and rounded at the ends, bright scarlet, lustrous, marked by numerous small dark lenticels $\frac{3}{4}$ in. long, from $\frac{1}{2}$ to $\frac{5}{8}$ in. thick; calyx-cavity broad and deep, the lobes much enlarged, coarsely serrate, usually erect and incurved; flesh thin and pale; nutlets 5, rounded and deeply grooved on the back, $\frac{1}{3}$ in. long.

A tree from 18 to 20 ft. in height with a stout trunk a foot in diameter and short ascending branches forming a broad open shapely head, and rather slender slightly zigzag branchlets marked by numerous small pale lenticels, dark chestnut-brown and slightly villose when they first appear, becoming bright chestnut-brown and very lustrous during their first season and ashy-gray during their second year, and armed with few stout straight or slightly curved chestnut-brown lustrous spines from $1\frac{1}{2}$ to 2 in. long. Winter-buds nearly globose, bright red, very lustrous, $\frac{1}{8}$ in. in diameter.

Flowers during the last week of May. Fruit ripens and mostly falls during the second half of September.

Rochester, N. Y., C. C. Laney and John Dunbar, 1899 and 1900.

This handsome tree is most conveniently placed in the *Flabellatae* group with *Crataegus Holmesiana* Ashe. From that species it differs in its larger darker green and more scabrous mature leaves, in its more lax villose corymbs, larger flowers on longer pedicels, with coarsely glandular-serrate calyx-lobes, more numerous stamens and styles, and in its larger and later-ripening fruit.

✓ *Crataegus lucorum*, n. sp.—Leaves broadly ovate to obovate or rarely oval, acute or acuminate, gradually narrowed and full and rounded or broadly cuneate at the base, deeply divided above the middle into three or four pairs of broad acute or acuminate lobes,

dentate, except at the very base, with straight glandular teeth; when the flowers open not more than one third grown, bronze color, covered above with short soft pale hairs, glabrous below, and at maturity membranaceous, smooth dull dark green and glabrous on the upper surface, pale yellow-green on the lower surface, from $1\frac{1}{2}$ to 2 in. long and broad, with slender yellow midribs slightly impressed above and thin primary veins running obliquely to the points of the lobes; petioles very slender, often short-winged above, nearly terete below, glandular, from 1 to $1\frac{1}{2}$ in. in length; stipules lanceolate to oblanceolate, finely glandular-serrate, from $\frac{1}{4}$ to $\frac{1}{2}$ in. in length, caducous. Flowers $\frac{3}{4}$ in. in diameter on slender pedicels in narrow compact few-flowered thin branched slightly villose corymbs; bracts and bractlets linear-lanceolate, glandular, caducous; calyx-tube broadly obconic, glabrous, the lobes narrow, acuminate, conspicuously glandular-serrate, villose on the upper surface, reflexed after anthesis; stamens 20; filaments slender; anthers small, dark purple; styles 4 or 5. Fruit in erect few-fruited slightly villose clusters, pear-shaped until nearly fully grown, but at maturity oblong or somewhat obovate, full and rounded at the ends, crimson, lustrous, marked by small pale lenticels, from $\frac{1}{2}$ to $\frac{5}{8}$ in. long; calyx-cavity deep but narrow, the lobes elongated, glandular-serrate, villose above, spreading and closely appressed, often deciduous before the maturity of the fruit; flesh thick, yellow, dry, and mealy; nutlets 4 or 5, thin, rounded, and obscurely or not all ridged on the back from $\frac{1}{2}$ to $\frac{5}{8}$ in. in length.

A tree from 20 to 25 ft. in height, with a tall trunk from 6 to 8 in. in diameter covered with close dark red-brown bark, slender erect branches forming a narrow head and thin slightly zigzag branchlets marked by numerous oblong pale lenticels, dark green and slightly villose when they first appear, dull orange-brown in their first season, ultimately dark gray-brown, and armed with occasional straight or slightly curved bright red-brown spines from 1 to $1\frac{1}{2}$ in. in length.

Flowers during the first week of May. Fruit ripens about the middle of September and soon falls.

Margins of oak groves in rich moist soil along the banks of sloughs near Barrington, Illinois, *E. J. Hill*, May and June 1899; *Hill* and *Sargent*, September 1900.

Distinguished from the other species in the *Tenuifoliae* group now recognized by it more numerous stamens.

✓ ***Crataegus Columbiana*, n. sp.**—Leaves oval to obovate, or on vigorous shoots often broadly ovate to oblong-oval, usually acute, or occasionally rounded at the apex, full and rounded or gradually narrowed or abruptly cuneate at the base, irregularly doubly glandular-serrate, except toward the base, with broad spreading teeth; on leading shoots sometimes slightly divided above the middle into three or four pairs of short acute lobes; when they unfold conspicuously plicate, covered above with long soft white hairs and below with a thick coat of snow-white tomentum, and at maturity thin but firm in texture, dark green, lustrous and scabrate on the upper surface, paler and pubescent or tomentose on the lower surface, from 2 to 2½ in. long and broad, and on leading shoots often from 2 to 4 in. long and broad, with slender midribs, few thin primary veins and conspicuous reticulate veinlets; petioles stout, tomentose, about ½ in. long; stipules lunate, often apiculate, more or less stipitate, often coarsely glandular serrate, villose, from ¼ to ½ in. long. Flower ¾ in. in diameter on slender elongated pedicels covered with hoary tomentum like the slender branches of the broad lax many-flowered compound corymbs; bracts and bractlets oblong-obovate, acute or rounded and apiculate at the apex, finely glandular-serrate, slightly villose; calyx-tube narrow, obconic, coated with thick hoary tomentum, the lobes short, acute, coarsely glandular-serrate, tomentose on both surfaces; stamens 20, filament slender, elongated; anthers small, dark red; styles 5, surrounded at the base by long tufts of snow white hairs. Fruit in few-fruited spreading tomentose clusters, subglobose, often rather longer than broad, full and rounded at the ends, tomentose until nearly grown, dark red, marked by numerous large pale dots, glabrous at maturity, from ⅜ to nearly ½ in. in diameter; calyx-tube prominent, with a broad deep cavity, the lobes short,

spreading, usually deciduous before the ripening of the fruit; flesh thin, light-colored, hard, and dry, shrivelling on the branches; nutlets 5, rounded and usually ridged on the back, about $\frac{1}{4}$ in. long.

A tree 25 ft. in height, with a tall trunk from 6 to 8 in. in diameter covered with pale closely appressed scales becoming dark brown near the base of old individuals, and numerous upright branches often forming a broad symmetrical head, and slender slightly zigzag branchlets coated when they first appear with hoary deciduous tomentum, light reddish-brown and more or less villose during their first season, becoming rather darker during their second year and ultimately pale ashy-gray, and armed with numerous stout straight or slightly curved chestnut-brown lustrous spines usually from 1 to $1\frac{1}{4}$ in. in length.

Flowers toward the end of March. Fruit ripens after the middle of October and sometimes does not entirely fall until the following spring.

Sandy bottom-lands of the Brazos river, usually in open forests of live oaks at Columbia, Texas, *B. F. Bush*, November 1899; *Canby, Bush*, and *Sargent*, March 1900; *Bush*, April and October 1900.

✓ *Crataegus Berlandieri*, n. sp.—Leaves oblong-obovate to oval, acute or acuminate at the apex, gradually narrowed below from near the middle and cuneate and entire at the base, irregularly divided into numerous acute or acuminate or, on vigorous shoots, rounded lobes, coarsely and often doubly serrate with broad spreading or incurved gland-tipped teeth; at the flowering time coated above with short pale soft caducous hairs and below with thick hoary tomentum, and at maturity rather thin but firm in texture, glabrous, dark green and very lustrous on the upper surface, pale and pubescent below, usually about 3 in. long and 2 in. wide, and on leading shoots often 4 or 5 in. long and from $2\frac{1}{2}$ to 2 in. wide, with slender midribs and remote primary veins slightly impressed above and conspicuous secondary veins and reticulate veinlets; petioles stout, usually more or less winged above, tomentose, ultimately pubescent, from $\frac{1}{2}$ to $\frac{3}{4}$ in. long;

stipules villose, falcate or on vigorous shoots lunate, coarsely glandular-serrate and frequently $\frac{1}{2}$ in. in length. Flowers $\frac{3}{4}$ in. in diameter on stout elongated pedicels coated with hoary tomentum like the stout branches of the broad compound many-flowered cymes becoming lax after anthesis; bracts and bractlets oblong-obovate to lanceolate, finely glandular-serrate, conspicuous; calyx-tube broadly obconic, tomentose, the lobes broad, acute, very coarsely glandular-serrate, villose on both surfaces; stamens 20, filaments slender, elongated; anthers small; styles 5, slender, surrounded at the base by small tufts of snowy white hairs. Fruit in lax drooping clusters, short-oblong to subglobose, scarlet, about $\frac{1}{2}$ in. long; calyx-cavity broad and deep, the lobes enlarged, coarsely serrate; flesh thin, yellow, dry, and hard; nutlets 5, rounded but not ridged, and occasionally obscurely grooved on the back, about $\frac{1}{4}$ in. long.

A tree 15 to 20 ft. in height, with spreading branches forming a broad open head, and slender slightly zigzag branchlets coated when they first appear with hoary tomentum, becoming puberulous and dull reddish-brown during the summer and pale gray-brown and glabrous during their second year, and nearly unarmed or furnished with occasional straight spines 1 in. in length.

Flowers from the middle to the end of March. Fruit ripens after the middle of October.

"De Bejur à Austin, Avril 1828," and "Villa d'Austin frio de los Brazos, Maio 1828," *J. L. Berlandier*, nos. 356 and 267 in *Herb. Gray*; near the banks of the Brazos river at Columbia, Texas, *B. F. Bush*, October 1899, March, April, and October 1900.

✓ *Crataegus nitida*, n. sp. (*Crataegus viridis* var. *nitida* Britton & Brown, *Ill. Fl.* 2: 242. 1897).—Glabrous with the exception of a few scattered pale caducous hairs on the upper side of the midribs of the unfolding leaves. Leaves lanceolate to oblong-obovate, acuminate at the apex, abruptly or gradually narrowed and cuneate at the entire base, coarsely glandular-serrate above with straight or incurved glandular teeth, more or less divided,

particularly on leading shoots, into two or three pairs of broad acute lobes; when they first unfold membranaceous, dark red, soon becoming green and lustrous, almost fully grown when the flowers open, and at maturity thick and coriaceous, dark green and very lustrous on the upper surface, pale and dull on the lower surface, from 2 to 3 in. long, from 1 to $1\frac{1}{2}$ in. wide, and on vigorous shoots often from 4 to 5 in. long and from 2 to $2\frac{1}{2}$ in. wide, with prominent midribs usually red on the lower side and few slender prominent primary veins slightly impressed above and usually running to the points of the lobes; petioles stout, grooved, more or less winged above by the decurrent bases of the blades, glandular particularly on vigorous shoots, from $\frac{1}{2}$ to $\frac{3}{4}$ in. long; stipules on vigorous shoots lunate, stipitate, coarsely glandular-serrate, occasionally $\frac{1}{2}$ in. in length. Flowers $\frac{3}{4}$ in. in diameter on slender elongated pedicels in broad compound very thin-branched many-flowered corymbs; calyx-tube narrowly obconic, the lobes narrow, acuminate, elongated, entire or sparingly and irregularly glandular-serrate, reflexed after anthesis; stamens 15 to 20; filaments slender; anthers small, pale yellow; styles 2 to 5. Fruit in many-fruited drooping clusters, oblong, dull brick red, pruinose with a slight glaucous bloom, marked by small dark lenticels, from $\frac{1}{2}$ to $\frac{5}{8}$ in. long, $\frac{1}{3}$ in. thick; calyx-cavity deep and narrow, the lobes little enlarged, dark red near the base on the upper side, usually erect, often deciduous before the maturity of the fruit; flesh yellow, thick, dry, sweet, and mealy; nutlets 2 to 5, rounded and ridged on the back with a low broad rounded ridge, light-colored, about $\frac{1}{4}$ in. long.

A tree often 30 ft. in height with a tall trunk from 12 to 18 in. in diameter covered with close dark bark broken into thick plate-like scales, spreading lower and erect upper branches forming a broad open rather irregular head, and slender nearly straight branchlets, bright orange-brown and lustrous during their first and second seasons, becoming pale reddish-brown during their third year, and ultimately ashy-gray, and unarmed or armed with few straight slender bright chestnut-brown lustrous spines from 1 to $1\frac{1}{2}$ in. in length.

Flowers early in May. Fruit ripens toward the end of October.

Rich woods on the drier parts of the bottom-lands of the Mississippi river opposite St. Louis. East St. Louis, Illinois, *G. W. Letterman*, June 10, 1881, and *H. Eggert*, 1882. Banks of Mississippi river, near Oquawka, Illinois, *H. N. Patterson*. In November 1882, Mr. Letterman collected specimens of a *Crataegus* at Prescott, Arkansas, which may possibly belong to this species but the specimens are too fragmentary to make the determination satisfactory.

In the Arnold Arboretum the flowers of *Crataegus nitida* open during the first week in June and the fruit ripens towards the end of October and falls gradually. At this season of the year it is a handsome object, the large leaves of the long vigorous shoots having gradually turned to a rich orange-yellow color through shades of bronze and orange-red, while the leaves on the shoots of lateral branchlets are still green and very lustrous and make a beautiful contrast with the abundant but rather dull-colored fruit.

This species, which was distinguished by Dr. Engelmann on its discovery as *Crataegus nitens* in herb. was not published by him. It has been variously considered a variety of *Crataegus viridis* L., and as a natural hybrid of that species and of *Crataegus Crus-galli* L. The supposition of a hybrid can probably be safely dismissed. The plants are too numerous and were formerly too generally distributed over the Mississippi bottoms near St. Louis to make such a supposition probable; and the seedlings of this tree raised at the Arnold Arboretum which flower and fruit freely every year show none of the variation found in the descendants of hybrids when these are fertile. From *Crataegus viridis* it differs in its larger and much thicker and more lustrous leaves, larger flowers, much larger oblong pruinose fruit, and in its dark close bark, the bark of *Crataegus viridis* being pale or often nearly white and covered with thin loose scales.

✓ ***Crataegus Brazoria*, n. sp.**—Leaves oval to obovate, acute or acuminate at the apex, sharply wedge-shaped, or on leading shoots occasionally oblong and usually broadly cuneate or sometimes rounded at the base, coarsely and irregularly glandular-serrate above the middle with spreading teeth, mostly entire below; when the flowers unfold covered on both surfaces with short soft pale hairs, particularly on the lower side of the thin midribs and primary veins, and at maturity thin and firm, glabrous, dark green and lustrous on the upper surface, paler on the

lower surface, from 2 to $2\frac{1}{2}$ in. long, from $1\frac{1}{4}$ to $1\frac{1}{2}$ in. wide, and on leading shoots often from 3 to 4 in. long and 3 in. wide; petioles slender, more or less winged above, tomentose, ultimately glabrous or puberulous, from $\frac{1}{2}$ to $\frac{3}{4}$ in. long; stipules foliaceous, slightly falcate, acuminate, coarsely serrate, villose, long-stalked, from $\frac{1}{3}$ to $\frac{1}{2}$ in. long, often $\frac{1}{3}$ in. wide, or on vigorous shoots lunate and usually entire. Flowers about $\frac{3}{4}$ in. in diameter in loose broad many-flowered compound thin-branched villose corymbs; calyx-tube narrowly obconic, villose with long matted white hairs, the lobes lanceolate, acuminate, obscurely glandular-serrate or nearly entire, villose on both surfaces, reflexed after anthesis; stamens 20; filaments slender, elongated; anthers small, dark red; styles 5, surrounded at the base by a thin ring of hoary tomentum. Fruit in spreading or drooping few-fruited glabrous clusters, subglobose or often rather longer than broad, bright canary-yellow, marked by a few large dark lenticels about $\frac{1}{3}$ in. long; calyx-tube elongated, with a broad deep cavity, the lobes deciduous before the maturity of the fruit; flesh thin, light-colored, dry and mealy; nutlets 5, rounded and ridged on the back, about $\frac{1}{4}$ in. long.

Flowers from the middle to the end of March. Fruit ripens after the 1st of October.

A tree 20 ft. in height with a trunk 6 in. in diameter and 8 ft. tall with ashy gray bark covered with small closely appressed scales, numerous upright branches forming a handsome symmetrical round-topped head and slender slightly zigzag branchlets marked by small oblong pale lenticels, coated when they first appear with hoary tomentum, soon becoming glabrous and light reddish-brown, and ashy-gray during their second year, and apparently unarmed.

Still known only from a single individual growing by the roadside in the bottoms of the Brazos river in the town of Brazoria, Texas, where it was found on March 25, 1900, by *W. M. Canby*, *B. F. Bush*, and *C. S. Sargent*, and subsequently visited by Mr. Bush in April and October, 1900.

This very distinct and interesting species can perhaps be best grouped with *Crataegus viridis* Linn. From that species it differs in its larger flowers, in the bright canary-colored fruits, unlike in color those produced by any of the North American species now known, in the form and texture of the leaves and in the color of the bark of the trunk and branchlets.

✓ *Crataegus glabriuscula*, n. sp. Glabrous with the exception of a few soft caducous hairs on the under surface of the large leaves of vigorous shoots and on the upper side of the calyx-lobes. Leaves oblong-ovate to semi-orbicular, or to broadly ovate on vigorous shoots, rounded, acute, or short-pointed at the apex, cuneate from below the middle and decurrent on the slender often glandular petioles, coarsely doubly serrate except toward the base, occasionally more or less deeply lobed above the middle, particularly on vigorous shoots, with two or three pairs of short broad acute lobes, membranaceous at the flowering time but at maturity subcoriaceous, hard and firm, dark green and lustrous on the upper surface, pale on the lower surface, from $1\frac{1}{2}$ to 2 in. long, from $\frac{3}{4}$ to $\frac{1}{2}$ in. wide, with slender pale yellow midribs and primary veins running obliquely toward the apex of the leaf, conspicuous secondary veins and reticulate veinlets; stipules lunate to semiorbicular, coarsely glandular serrate, from $\frac{1}{3}$ to $\frac{1}{2}$ in. wide. Flowers $\frac{1}{2}$ in. in diameter on slender elongated pedicels, in few-flowered rather compact compound thin branched corymbs; bracts and bractlets linear, obscurely glandular-serrate, minute, caducous; calyx-tube broadly obconic, the lobes short, acute, entire or slightly and irregularly glandular-serrate, reflexed after anthesis; stamens 20; filaments slender, elongated; anthers comparatively large; styles 5. Fruit drooping on slender stems, oblong to obovate, dull orange-color, marked by minute dark lenticels, $\frac{1}{4}$ in. long; calyx-tube elongated with a deep broad cavity, the lobes but little enlarged, dull red on the upper surface toward the base, spreading or appressed, often deciduous; flesh very thin, yellow, dry and hard; nutlets 5, rounded or obscurely grooved on the back, about $\frac{3}{16}$ in. long.

A tree 20 to 25 ft. in height with a slender trunk often 12

in. in diameter, covered with brown scaly bark, ascending branches, forming a narrow head, and thin branchlets marked by many small pale lenticels, dark red-brown when they first appear, becoming bright chestnut-brown and very lustrous during their first summer and ashy-gray during their second year, and unarmed or armed with very slender straight chestnut-brown lustrous spines usually from $\frac{3}{4}$ to 1 in. in length.

Flowers about the middle of April. Fruit ripens in August. High dry bottom lands of the Trinity river and its branches at Dallas, Texas, in forests of *Ulmus crassifolia* and *Celtis Mississippensis*, J. Reverchon, July 1899, B. F. Bush, April 1900.

Betula Alaskana, n. sp.—Leaves rhomboidal to broadly ovate and truncate or rounded at the base, acuminate, very coarsely dentate above the middle with glandular teeth, entire below, more or less covered with resinous glands while young, from $1\frac{1}{2}$ to 3 in. long, from 1 to $1\frac{1}{2}$ in. wide, dark green on the upper surface, yellow-green on the lower surface, the slender midribs and remote veins puberulous below or ultimately glabrous. Staminate catkins clustered, sessile, about 1 in. long, $\frac{1}{8}$ in. thick, their scales ovate, acuminate, puberulous, light red, yellow on the margins. Pistillate catkins slender, cylindrical, pedunculate, about 1 in. long and $\frac{1}{8}$ in. thick. Fruiting catkins from 1 to $1\frac{1}{4}$ in. long, from $\frac{1}{3}$ to $\frac{1}{2}$ in. thick, their scales about as long as broad, ciliate on the margins of the lobes, the central lobe acute or acuminate, the lateral lobes erect and acute or spreading and rounded.

A tree with close light red bark, usually from 35 to 40 ft. in height with a trunk 6 or 8 in. in diameter, and occasionally 50 ft. in height with a trunk a foot in diameter, spreading and pendulous branches, slender red-brown branchlets more or less verrucose with conspicuous resinous glands, and obovate obtuse winter buds $\frac{1}{4}$ in. in length.

Saskatchewan, E. Bourgeau, 1858 (in Herb. Gray); near Prince Albert in latitude 53, July 1876, John Macoun; north-westward, reaching the Alaskan coast on the shores of the Lynn Canal (Muir, Canby, and Sargent, August 1897); and westward.

This is the "canoe birch" of all travelers in Alaska, and it is the common birch tree of the Yukon valley, where it grows sparingly near the banks of that river in coniferous forests and abundantly on sunny slopes and hillsides, and extends down the river at least as far as the Russian mission, two hundred and thirty-three miles above its mouth (M. W. Gorman *in litt.*).

From *Betula papyrifera* Marsh, which is common in one of its forms in southern Alberta, northern Idaho, and Montana, and in the Blue mountain region of eastern Washington and Oregon, *Betula Alaskana* may be distinguished by the close reddish bark of the trunk which is less flexible and does not separate as easily into layers as the bark of the eastern canoe birch, by the much more verrucose branches, obtuse winter buds, rhomboidal long-pointed leaves, stouter fruiting catkins, and by the more habitually acute or acuminate central lobe of their scales. The specimen in Herb. Gray collected by Bourgeau in flower on the Saskatchewan was referred by Regel (*Bull. Mosc.* 18: 398; *DC. Prodr.* 16²: 164) to his *Betula alba*, subspecies *verrucosa* δ *resinifera*, the Asiatic types of this variety being from Udskoi in eastern Siberia and from Transbaical. Specimens of the Alaska tree sent by me to the Herbarium of the Imperial Botanic Garden at St. Petersburg were pronounced, however, unlike any Asiatic species, and with the slight knowledge of the northern Asiatic species of *Betula* which we possess in this country it does not seem safe to follow Regel in uniting North American with Asiatic species. To Mr. Gorman I am indebted for very complete specimens of *Betula Alaskana* collected at different points on the Yukon in 1899, and for the first reliable information I have been able to obtain in regard to the trees of the Yukon valley and their distribution.

BETULA OCCIDENTALIS Hooker. There are three arborescent birches in the region between the eastern base of the Rocky mountains in the United States and the shores of Puget sound and British Columbia.

First, *Betula papyrifera* Marsh, in one of its forms which enters this region from the east and is not rare in northwestern Nebraska, northern Dakota, Idaho, and Montana, and reaches the mountains of eastern Oregon.

Second, the large tree which grows on the lower Fraser river, on the shores and islands of Puget sound, and on Vancouver island. This tree has reddish bark which is particularly noticeable on young plants, pubescent branchlets, acute winter-buds, leaves pubescent on the lower surface, and fruiting

catkins about $1\frac{1}{4}$ in. long and $\frac{1}{2}$ in. thick, with scales longer than broad, the middle lobe being acuminate and much elongated. Specimens of this tree, which is perhaps the largest of all birch-trees, were first gathered on the shores of the straits of Fuca by Dr. John Scouler during his visit to the northwest coast in 1825-1827. These specimens were described by Hooker in his *Flora Boreali-Americana* as *Betula occidentalis*, although with them he united a specimen collected by Douglas in the interior but west of the Rocky mountains. The tree from the straits of Fuca appeared first in the description of *Betula occidentalis* which was evidently drawn principally from the specimen of that tree, and must be considered the type of Hooker's species, while the second specimen included in this description, collected by Douglas, is the Rocky mountain form of *Betula papyrifera*. In the shape of the leaves this species resembles some of the forms of *Betula papyrifera*. The bark, however, is very different from that of the eastern tree, and it is probably best to consider it a species.

Third, the half-shrubby dark-barked species with spreading gracefully drooping stems which ranges as far south as Colorado, Utah, and northern California. This plant was collected by Nuttall on the Sweetwater, one of the branches of the Platte, and was first described and figured by him as *Betula occidentalis* (*Sylva* 1: 23. pl. 7). Torrey in the Botany of Fremont's Expedition repeats this error. This same species was also described and figured in *King's Rep.* (5: 323. pl. 35) as *Betula occidentalis* by Watson who repeated his error in the *Botany of California*, and it is this plant which is described and figured as *Betula occidentalis* in my ninth volume of *The Silva of North America*, where an allusion only is made to the true *Betula occidentalis* of the coast in a note under *Betula papyrifera*. Nuttall found another small birch in the Rocky mountain region and on the plains of the Columbia which he described and figured as *Betula rhombifolia* in the first volume of his *Sylva* published in 1842. This plant, judging by one of Nuttall's original specimens in the Gray Herbarium, is the narrow-coned form of the plant described by

Nuttall as *Betula occidentalis*, which is common in eastern Oregon and Washington and eastward into Montana and Idaho. If the two forms, which seem to vary only in the thickness of the cones, are considered to belong to one species, this would have to bear Nuttall's name of *Betula rhombifolia*, if Tausch four years before had not used that name for an European species. Some of the specimens of this third species bear a strong resemblance to a fragmentary specimen of *Betula microphylla* Bunge, as pointed out to me by Mr. M. L. Fernald, but this evidence of the identity of the Rocky mountain and the Altai plants would hardly seem to warrant the adoption of Bunge's name for our tree, for which I now propose the name of ***Betula fontinalis***.

✓ ***Cupressus pygmaea***, n. sp. (*Cupressus Goveniana* var. *pygmaea* Lemmon, *Handbook West-American Cone-bearers* 77. 1895. *Cupressus Goveniana* Sargent, *Silva, N. Am.* 10: 107 in part (not Gordon). 1896.—The *Cupressus* of the coast region of Mendocino county, California, can be readily distinguished from the other North American species by its thin black seeds not more than $\frac{1}{8}$ in. long which show no tendency to vary to the thick light red seeds of *Cupressus Goveniana* which are fully $\frac{1}{4}$ in. in length. This character and the isolation of the region which it inhabits remote from that occupied by other species make it possible and convenient to separate this northern tree from the *Cupressus Goveniana* of central and southern California, to which it was doubtfully referred by Englemann in herb. who, like myself when the tenth volume of *The Silva of North America* was published in 1896, was unacquainted with the seeds. From *Cupressus Goveniana* the northern tree differs also in its rather stouter branchlets with deeper green never glaucous foliage, usually sessile often oblong cones with less prominent bosses on their scales which vary from six to ten in number, while the cones of *Cupressus Goveniana* are usually composed of six scales. In a genus like *Cupressus* where individuals vary greatly within certain limits and good specific characters are so difficult to find, these peculiarities would hardly justify the separation of the northern tree from *Cupressus Goveniana* were it not for the

character found in the seeds which make this the easiest of our species to recognize.

Cupressus pygmaea inhabits the high barren region on the coast of Mendocino county, extending from Ten Mile run on the north to the Navarro on the south, and, beginning about three quarters of a mile from the ocean, does not extend inland more than four miles. The soil of these barrens is yellow clay covered with deposits of sea sand and a thin layer of peat. On this poor soil the plants begin to bear cones when only a foot or two high, but on the borders of the barrens and of the deep gullies which penetrate them where trees occasionally escape for several years the fires which constantly sweep over the region they grow in better soil to a height of 30 or 40 feet, but from overcrowding rarely develop the spreading branches peculiar to all species of *Cupressus* growing in abundant space.

The name *pygmaea* used by Lemmon to distinguish the dwarf plant stunted by overcrowding and insufficient nourishment is unfortunate as a specific name, for there is no difference between the smallest and the largest plants except in size; and it is probable that individuals of this species on the borders of the barrens, if they could be protected from fire, would in time grow to a large size, for the oldest plants now standing show no signs of maturity and none of them are believed to be much more than fifty years old (C. Purdy *in litt.*).

ARNOLD ARBORETUM.



Sargent, Charles Sprague. 1901. "New or Little Known North American Trees. III." *Botanical gazette* 31(4), 217–240. <https://doi.org/10.1086/328097>.

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