

CRATAEGUS IN ROCHESTER, NEW YORK.

BY C. S. SARGENT.

During a visit which I made in Rochester in the autumn of 1899, Mr. C. C. Laney, the superintendent of the parks of that city, called my attention to a number of forms of *Crataegus* which seemed unlike any of the described species and this hurried examination led Mr. Laney, his assistant, Mr. John Dunbar, and Mr. M. S. Baxter, to make a careful and systematic study of the group in the neighborhood of the city and in parts of the adjacent country. The results of these studies are found in this preliminary paper which serves to show the remarkable richness of the valley of the lower Genesee River in species of *Crataegus*. This segregation of forms seems to confirm the fact which I have long suspected, that the country surrounding Lake Ontario and the eastern end of Lake Erie and the valley of the St. Lawrence River, as far east at least as Montreal Island, is richer in forms of *Crataegus* and in the multiplication of individuals than any other part of the world, with the exception perhaps of the Red River valley in Arkansas. Thanks to the industry of Mr. Laney and his assistants, *Crataegus* has now been systematically and carefully studied at Rochester through three years. Many of the species are now well known at all seasons of the year; others, however, are still imperfectly known, and the range of all the species beyond the immediate neighborhood of the city is still to be determined. This paper, therefore, must be considered as preliminary to a fuller description of the genus in the Lake Ontario country dependent on further field work.

In the limitation of species particular attention has been given to the number of stamens, the color of the anthers, and the character and time of ripening of the fruit. The sections in which the species are grouped are those which are adopted in the thirteenth volume of my *Silva of North America*.

§ CRUS-GALLI.

Fruit medium size, red, often slightly pruinose; nutlets 1-3, obtuse, prominently ridged on the back; corymbs many-flowered; stamens 10-20; anthers rose color; leaves subcoriaceous, dark green and lustrous.

Glabrous; leaves obovate-cuneiform to broadly ovate, their primary veins within the parenchyma; stamens 10; nutlets 2. 1. *C. Crus-galli*.

Slightly villose; leaves oblong-obovate to oval, their veins without the parenchyma, prominent; stamens 10-20; nutlets 1-2. 2. *C. persimilis*.

Crataegus Crus-galli, Linnaeus. Sargent, *Silva N. Am.*, iv. 91, t 128. Common.

Crataegus persimilis, *n. sp.*

Leaves oblong-obovate to oval, acuminate, narrowed and short-pointed or rarely rounded at the apex, gradually contracted from near the middle and cuneate at the narrow entire base, sharply and doubly serrate above, with glandular teeth; nearly fully grown when the flowers open and then thin but firm in texture, glabrous with the exception of a few caducous pale hairs on the upper side of the base of the midribs, dark green and lustrous above and light orange-green below; at maturity coriaceous, lustrous on the upper surface, dull and whitish on the lower surface, 4-6.5 cm. long, 2-3 cm. wide, with thin midribs and slender but prominent primary veins, dark orange colored early in the season, becoming pale yellow; petioles slender, wing-margined sometimes to the middle by the decurrent base of the leaf-blades, grooved, occasionally glandular, with minute scattered glands, at first sparingly villose, soon glabrous, 0.8-1.5 cm. in length; stipules linear, acuminate, furnished on the margins with minute glands, long, caducous. Flowers about 1.2 cm. in diameter on long slender slightly villose pedicels, in broad many-flowered thin branched corymbs; bracts and bractlets linear, acuminate, glandular, mostly persistent until the flowers open; calyx-tube narrowly obconic, glabrous, the lobes long, slender, acuminate, coarsely glandular-serrate glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 10-20; styles 2, rarely 1, surrounded at the base by a narrow ring of pale tomentum. Fruit on slender reddish pedicels in few-fruited drooping clusters, oblong to subglobose, full and

rounded at the ends, dark crimson, lustrous, marked by occasional large dark dots, about 1.2 cm. long and 1.1 cm. wide; calyx sessile, with a deep narrow cavity and elongated serrate acute lobes gradually narrowed from broad bases, villose on the upper surface, reflexed and closely appressed, often deciduous from the ripe fruit; flesh thin, dry, pale yellow, of a disagreeable flavor; nutlets usually 2, rarely 1, full and rounded at the ends, prominently ridged on the back, with a high rounded ridge, or sometimes deeply grooved, 8-9 mm. long, 5-6 mm. wide.

A shrub 5 or 6 m. in height, with intricately branched stems 2-2.5 dm. in diameter, covered with dull gray bark separating near their base into small scales, or rarely arborescent with spreading branches, and slender only slightly zigzag branchlets, dark orange-green and marked by many large pale lenticels when they first appear, light orange-brown and lustrous at the end of their first season, and pale gray-brown the following year, and armed with many slender nearly straight dark purple shining spines 3-4 cm. in length and long—persistent on the stems. Flowers the first week of June. Fruit ripens from the first to the middle of October and falls toward the end of the month, sometimes retaining its shape and color on the ground until the following spring.

Rochester; moist rich soil; rare; Black Creek above B. R. & P. R. R. Bridge, *C. S. Sargent*, Sept. 16, 1901, Highland Avenue, near Clover Road, *C. S. Sargent*, September 19, 1899, *John Dunbar*, May 29 and June 8, 1901, East Avenue in creek lot east of Brighton, *C. C. Lancy*, Oct. 1902.

This species is closely related to *Crataegus Peoriensis*, Sargent, of central and northern Illinois, with leaves of the same form and the peculiar orange colored branchlets of the first year. It differs from it chiefly in its fewer-flowered corymbs, coarsely and constantly serrate calyx-lobes much more villose on the inner surface, in its usually more numerous stamens, in its fewer styles, small fruits and larger nutlets.

§ PRUINOSAE.

Fruit medium size, red, often slightly five-angled, more or less pruinose, the calyx-lobes usually raised on a short tube; corymbs few or many-flowered; stamens 10-20; leaves thick or subcoriaceous, usually blue-green, glabrous or slightly villose while young.

Stamens 20.

ANTHERS PURPLE OR RED.

Leaves oblong-ovate, villose on the upper surface while young; corymbs many-flowered; anthers dark maroon color; fruit oblong to oblong-ovate, crimson; nutlets 4-5. 3. *C. beata*.

Leaves ovate to rhombic, slightly villose while young, yellow-green; corymbs many-flowered; anthers red; fruit ovate to oblong, dark crimson; nutlets 3-4.

4. *C. Lennoniana*.

ANTHERS YELLOW.

Leaves broadly ovate, slightly hairy while young on the upper side of the midribs; corymbs few-flowered; fruit obovate to subglobose, dark green, becoming bright red and lustrous late in the season; nutlets usually 4; spines long and slender. 5. *C. leiophylla*.

Leaves oblong-ovate, slightly hairy on the upper surface while young; corymbs many-flowered; fruit oblong or slightly obovate, scarlet; nutlets 4 or 5; spines short and stout. 6. *C. formosa*.

Stamens 10 or less.

ANTHERS ROSE COLOR OR PURPLE.

Leaves oblong-ovate, slightly villose while young on the upper surface; glabrous at maturity; corymbs many-flowered; stamens 7-10; anthers dark rose color; fruit usually oblong-obovate, light cherry red; nutlets 3-4.

7. *C. compla*.

Leaves ovate, hirsute while young and scabrate at maturity on the upper surface; corymbs usually few-flowered; anthers purple; fruit subglobose to short-oblong, scarlet; nutlets 4-5. 8. *C. diffusa*.

Leaves oblong-ovate to oval, hirsute while young on the upper surface; corymbs few-flowered; stamens 10; anthers pale rose color; fruit subglobose and usually broader than high to short-obovate, crimson; nutlets 3-4.

9. *C. opulens*.

Leaves usually ovate to deltoid, villose while young; corymbs many-flowered; stamens 10; anthers dark purple; fruit globose, scarlet, scarcely pruinose; nutlets 4.

10. *C. Maineana*.

Crataegus beata, n. sp.

Glabrous with the exception of the hairs on the upper surface of the young leaves and petioles. Leaves oblong-ovate, acuminate, full and rounded or broadly concave-cuneate, or on leading shoots sometimes cordate at the entire base, sharply double serrate above, with straight gland-tipped teeth, and divided into numerous long narrow acuminate spreading lobes; when they unfold deeply tinged with red and villose on the upper surface, and about one-third grown when the flowers open, and then very thin, dark yellow, and still slightly hairy; at maturity thin but firm in texture, dark, dull blue-green and smooth above, pale blue-green below, 5-8 cm. long, 4-7 cm. wide, with stout yellow midribs and slender primary veins arching obliquely to the points of the lobes; petioles slender, slightly wing-margined at the apex, grooved, furnished with numerous small dark glands, sparingly hairy at first, soon glabrous, often rose color in the autumn, 2.5-4 cm. in length; stipules linear, acuminate, glandular, on leading shoots often lobed at the base, caducous. Flowers on long slender pedicels, in broad dense many-flowered compound corymbs; calyx-tube broadly obconic, the lobes separated by wide rounded sinuses, small, acuminate, entire or undulate or occasionally glandular on the margins, reflexed after anthesis; stamens 20; anthers large, dark maroon color; styles 4 or 5, surrounded at the base by a narrow ring of pale hairs. Fruit on slender pedicels in drooping many-fruited clusters, oblong to oblong-obovate, full and rounded at the ends, crimson, marked by many small pale dots, pruinose, 1.1-1.3 cm. long, 9-10 mm. wide; calyx comparatively small with a very short tube, a broad shallow cavity, and slender spreading nearly entire lobes, dark red on the upper side near the base, their tips often deciduous from the ripe fruit; flesh very thick, dry and mealy; nutlets usually 5, full and rounded at the apex, gradually narrowed to the acute base, rounded

and slightly grooved or irregularly ridged on the back, 6-7 mm. long.

A shrub 5 or 6 m. in height with numerous stems covered with dark gray bark, spreading into broad thickets, erect branches, and stout only slightly zigzag branchlets, dark orange-green tinged with red and marked by numerous small pale lenticels when they first appear, bright red-brown and very lustrous at the end of their first season, becoming light gray-brown the following year, and armed with many stout nearly straight bright red-brown shining spines 3.5-4.5 cm. long. Flowers from the 20th to the end of May. Fruit ripens at the end of September. In the autumn the leaves turn to a handsome lemon yellow.

Rochester, Highland Avenue, Beckwith farm, Float Bridge, Genesee Valley Park, *C. S. Sargent*, *John Dunbar*, September 19, 1900, and September, 1902, *John Dunbar*, May, September and October, 1901, on left side of Scottsville road at creek near Pennsylvania R. R. Round House ; Greece, *M. S. Baxter*, May, 1902.

***Crataegus Lennoniana*, n. sp.**

Glabrous with the exception of a few hairs on the young leaves and their petioles. Leaves ovate to rhombic, acuminate, gradually narrowed and concave-cuneate at the entire base, deeply serrate above, with blunt gland-tipped teeth, and usually divided into 4 or 5 pairs of short broad acuminate lateral lobes ; nearly half-grown when the flowers open and then membranaceous, light yellow-green and furnished with a few soft pale hairs on the upper surface particularly toward the base of the midribs ; at maturity thin, dark dull yellow-green and slightly roughened above, pale and glabrous below, 4-5 cm. long, 3-5 cm. wide, with stout orange-colored midribs and 4 or 5 pairs of primary veins arching obliquely to the points of the lobes ; petioles slender, narrowly wing-margined at the apex by the decurrent base of the leaf-blades, slightly hairy toward the apex while young, soon glabrous, 1.5-4 cm. in length ; stipules linear, acuminate, glandular, mostly deciduous before the flowers open ; on vigorous shoots leaves broadly ovate, subcoriaceous, deeply lobed, truncate or slightly cordate at the base, 5-6 cm. long and usually as wide or wider than long, with stout winged glandular petioles usually about 2 cm. in length. Flowers 1.2 cm. in diameter on short slender pedicels, in compact many-flowered thin-branched compound corymbs ; calyx-tube narrowly obconic, the lobes abruptly narrowed from broad bases, slender, acuminate, entire, occasionally

slightly serrate, reflexed after anthesis ; stamens 20 ; anthers small, red ; styles 3 or 4. Fruit on slender rigid reddish pedicels, in erect few-fruited clusters, ovate to oblong, full and rounded at the ends, dark crimson marked by occasional small pale dots, slightly pruinose, 1-1.2. cm. long, 8-10 mm. wide ; calyx prominent with a long calyx-tube, a deep narrow cavity, and spreading and closely appressed lobes, entire or slightly serrate toward the apex, dark red on the upper side near the base ; flesh thin, yellow, dry and mealy ; nutlets 3 or 4, full and rounded at the obtuse ends, ridged on the broad rounded back, with a low narrow ridge, 6 mm. in length.

A slender tree sometimes 7 or 8 m. in height, with a trunk branching one or two feet from the ground, and 1.5-2 dm. in diameter, and covered with ashy gray bark, small horizontal and ascending branches usually forming a broad symmetrical head, and slender zigzag branchlets dark green tinged with red and marked by large oblong pale lenticels when they first appear, bright red-brown and lustrous at the end of their first season, becoming dark gray-brown the following year and armed with many slender straight chestnut-brown or purplish shining spines 1.5-3 cm. in length, long persistent and occasionally compound. Flowers the first of June. Fruit ripens toward the end of October and does not entirely fall before the end of another month.

Rochester, *C. S. Sargent and John Dunbar*, October 15, 1901, September 24, 1902 ; Adams Basin, New York, *M. S. Baxter*, May 29, 1902 ; Buffalo, *John Dunbar*, October 6, 1902 ; Murray, *M. S. Baxter*, June 1, 1902.

This species is named for William Harvey Lennon, teacher of natural sciences in the Normal School at Brockport, New York, and a careful and enthusiastic student of the flora of Monroe County.

Crataegus leiophylla, *n. sp.*

Glabrous with the exception of a few hairs on the upper side of the midribs of young leaves. Leaves broadly ovate, acuminate, rounded, truncate or rarely cuneate at the wide entire base, sharply and doubly serrate above, with straight glandular teeth, and divided into four or five pairs of narrow acuminate spreading lateral lobes ; bright red as they enfold and about half-grown when the flowers open, and then thin and light yellow-green more or less tinged with red ; at maturity thick and firm in texture, dark dull blue-green on the upper surface, light yellow-green on the lower surface, 5-6 cm. long and

broad, and often broader than long, with slender yellow midribs and 4 or 5 pairs of thin primary veins arching obliquely to the points of the lobes ; petioles slender, slightly wing-margined at the apex, grooved, 2.5-4 cm. in length : stipules linear to lanceolate, glandular, turning red in fading, fugaceous. Flowers .2 cm. in diameter, and very flat when fully expanded, on short, slender pedicels, in compact usually 5-7-flowered compound corymbs ; bracts and bractlets linear, glandular, mostly deciduous before the flowers open ; calyx-tube broadly obconic, the lobes gradually narrowed from wide bases, small, acuminate, entire or slightly and irregularly glandular-serrate, reflexed after anthesis ; stamens 20 ; anthers pale yellow ; styles 4 or 5, villous toward the base and surrounded by a broad ring of matted white hairs. Fruit in few fruited erect or spreading clusters, obovate, full and rounded at the apex, gradually narrowed below into the thickened end of the short stout pedicel, dark green and pruinose until late in the season and when fully ripe bright red and lustrous, rather broader than long, 1.2-1.4 cm. in diameter ; calyx large and prominent, with a short tube, a broad deep cavity, and enlarged spreading and reflexed entire or sparingly serrate lobes often deciduous from the ripe fruit ; flesh thin, yellow, dry and mealy ; nutlets usually 4, full and rounded at the apex, gradually narrowed and acute at the base, prominently ridged, with a high broad ridge or rounded and slightly grooved on the back, 7-8 mm. long, 4-5 mm. thick.

A slender intricately branched shrub 3 to 5 m. in height with stems 6-12 cm. in diameter, covered with pale olive-green bark, dark and scaly toward the base, erect branches, and thin nearly straight branchlets olive-green tinged with red and marked by many small pale lenticels when they first appear, dull orange-green at the end of their first season, and dark gray or reddish brown the following year and armed with very numerous slender nearly straight bright chestnut-brown shining spines 4-6 cm. in length, and long persistent on the stems. Flowers at the end of May. Fruit ripens early in November and falls from the middle to the end of the month, often retaining its form and color until the following spring.

Rochester ; common on both sides of the Genesee River north of the city, *John Dunbar*, *Henry T. Brown* and *M. S. Baxter*, May, 1901, *C. S. Sargent*, *John Dunbar* and *M. S. Baxter*, October, 1902.

Crataegus formosa, n. sp.

Nearly glabrous. Leaves oblong-ovate, acuminate, full and rounded or cuneate or rarely truncate at the wide entire base, sharply and doubly serrate above, with straight glandular teeth, and slightly divided usually only above the middle into three or four pairs of narrow acuminate spreading lobes; more than half-grown when the flowers open and then very thin, light yellow-green and slightly hairy above along the midribs, paler and glabrous below; at maturity subcoriaceous, dark dull bluish green on the upper surface, pale on the lower surface, 5.5-7 cm. long, 4-6.5 cm. wide, with slender yellow midribs, 4 or 5 pairs of thin prominent primary veins extending obliquely to the points of the lobes, and somewhat conspicuous finely reticulated veinlets; petioles slender, usually slightly wing-margined at the apex, grooved, sparingly glandular early in the season, 1.2-2 cm. in length. Flowers 2-2.5 cm. in diameter on long slender pedicels, in broad usually about 10-flowered thin-branched corymbs; bracts and bractlets oblong-obovate to linear, glandular, mostly deciduous before the flowers open; calyx-tube broadly obconic, often furnished near the base with a few long white caducous hairs, the lobes gradually narrowed from wide bases, small, acuminate, entire or occasionally and irregularly glandular-serrate, reflexed after anthesis; stamens 20; anthers pale yellow; styles usually 3, surrounded at the base by a ring of pale tomentum. Fruit on long slender pedicels, in few-fruited spreading clusters, oblong or slightly obovate, full and rounded at the ends, scarlet, marked by large pale lenticels, pruinose, 1.2-1.5 cm. long, about 1 cm. wide; calyx prominent, sessile, with a broad deep cavity and enlarged spreading entire or serrate lobes, dark red on the upper side near the base, their tips often deciduous from the ripe fruit; flesh thin, yellow, dry and mealy; nutlets 4 or 5, thin, narrowed at the rounded ends, very prominently ridged on the back, with a high rounded often doubly groove ridge, 8-9 mm. in length.

A bush 3-5 m. in height, with stems branching from the base, often 1-1.2 dm. in diameter, and covered with dark olive-green bark, becoming dark gray-brown and scaly at the base, stout branchlets dark orange-green and marked by many large pale lenticels when they first appear, dull dark reddish brown or purple at the end of their first season, very dark brown the following year and armed with stout nearly straight red-brown shining spines usually not more than

3 cm. in length, long persistent on the stems, frequently becoming compound. Flowers about the 20th of May. Fruit ripens the middle of October.

Rochester ; common on both sides of the Genesee River north of the city, *J. Dunbar*, May 23, 1901, October 14, 1902, *C. S. Sargent*, September 29, 1902, *M. S. Baxler*, May, 1902; Buffalo, *J. Dunbar*, October 6, 1902.

***Crataegus compta*, n. sp.**

Glabrous with the exception of the hairs on the upper surface of the unfolding leaves and young petioles. Leaves oblong-ovate, acuminate, gradually and abruptly narrowed and rounded or broad and subcordate at the entire base, sharply often doubly serrate above, with straight gland-tipped teeth, and slightly divided into three or four pairs of broad acute lateral lobes ; as they unfold tinged with red and sparingly villose on the upper surface, and when the flowers open about one-third grown and then light yellow-green and scabrate above and pale below ; at maturity coriaceous, glabrous, very dark dull blue-green on the upper surface, pale and glaucous on the lower surface, 6-8 cm. long, 4.5-6 cm. wide, with slender yellow midribs slightly impressed on the upper side and often rose color in the autumn on the lower side, and very thin yellow primary veins extending obliquely to the points of the lobes ; petioles slender, wing-margined at the apex, grooved, sparingly glandular, with numerous deciduous bright red glands, at first villose, soon glabrous, often rose color late in the season, 3-4 cm. long ; leaves on vigorous shoots usually broader in proportion to their length, more deeply lobed, 6-7 cm. long and broad, with stout petioles wing-margined to below the middle, and glandular throughout the season, their stipules lunate, glandular-serrate, early deciduous. Flowers 1.4-1.6 cm. in diameter on slender pedicels, in compact many-flowered thin-branched compound corymbs ; bracts and bractlets linear to linear-obovate, acuminate, glandular, bright red, mostly deciduous before the flowers open ; calyx-tube narrowly obconic, the lobes slender, acuminate, glandular-serrate usually only above the middle, bright red toward the apex, reflexed after anthesis ; stamens 7-10 ; anthers dark rose color ; styles 3 or 4, surrounded at the base by a narrow ring of pale tomentum. Fruit on stout pedicels, in few-fruited drooping clusters, oblong-obovate to rarely oblong, full and rounded at the ends, light cherry red marked by small pale dots, covered with a glaucous bloom, 1.2-1.8 cm. in length, about 1.2 cm.

in width ; calyx sessile, with a deep narrow cavity and elongated distinctly oblanceolate lobes coarsely glandular-serrate above the middle, dark red on the upper side near the base, spreading and incurved, often deciduous from the ripe fruit ; flesh yellow, thick, firm and bitter ; nutlets usually 4, rarely 3, thick, acute at the ends, prominently ridged on the back, with a high narrow ridge, 8 mm. long.

A broad shrub with numerous stout stems covered with dark gray-brown bark, many ascending branches and stout erect branchlets, light orange-green when they first appear, light olive or reddish brown, lustrous and marked by many small pale lenticels at the end of their first season, becoming ashy gray the following year and armed with many stout straight or slightly curved light chestnut-brown shining spines 3-4 cm. in length : winter-buds globose, about 5 mm. in diameter, covered with dark red lustrous scales. Flowers from the 20th to the 25th of May. Fruit ripens the middle of October.

Rochester ; common in the Genesee Valley, on rich heavy soil in open situations, *C. C. Lancy*, May, 1900, *C. S. Sargent*, September, 1900 and 1902, *C. C. Lancy* and *John Dunbar*, May, June and September, 1901 ; Rush and Avon, New York, *M. S. Baxter*, August, 1902 ; Buffalo, September, 1901 and Chippewa, Ontario, October, 1902, *John Dunbar*.

Crataegus diffusa, *n. sp.*

Glabrous, with the exception of the hairs on the upper surface of the young leaves. Leaves ovate, acuminate, full and rounded or broadly cuneate at the entire or glandular base, sharply and finely serrate above, with straight gland-tipped teeth, and divided into four or five pairs of short, broad acuminate lateral lobes ; tinged with red and covered on the upper surface when they unfold with short, rigid white hairs more or less persistent until the flowers open but then membranaceous, light yellow-green, and paler on the under than on the upper surface ; at maturity thin but firm in texture, dark bluish green lustrous and slightly scabrate above, pale, blue-green below, 5.5-7.5 cm. long, 5-6.5 cm. wide, with slender yellow midribs often tinged with rose color toward the base late in the season, and thin primary veins, arching obliquely to the points of the lobes ; petioles slender, wing-margined toward the apex by the decurrent base of the leaf-blades, grooved, glandular early in the season, with minute dark red scattered glands, 3-4 cm. in length. Flowers 1.6-2 cm. in diameter on long,

slender pedicels, in wide 6-12-flowered thin-branched compound corymbs; bracts and bractlets linear to linear-obovate, glandular, mostly deciduous before the flowers open; calyx-tube broadly obconic, the lobes wide, acuminate, irregularly serrate usually only below the middle, reflexed after anthesis; stamens 10; anthers purple, styles 4 or 5, surrounded at the base by a broad ring of hoary tomentum. Fruit on elongated reddish pedicels, in drooping clusters, subglobose to short-oblong, flattened at the ends, scarlet, lustrous, slightly pruinose, marked by occasional small dark dots, 1-1.2 cm. in diameter; calyx sessile, with a wide shallow cavity, the lobes gradually narrowed from broad bases, coarsely glandular-serrate, dark red on the upper side toward the base, spreading and appressed, or erect and incurved, mostly persistent on the ripe fruit; flesh thick, tinged with red, sweet, dry and mealy; nutlets 4 or 5, thin, acute at the ends, ridged, with a broad low grooved ridge or rounded and slightly grooved on the back, about 8 cm. in length.

An intricately branched shrub often 5 or 6 m. in height, with numerous stems spreading into broad dense thickets, and stout only slightly zigzag branchlets, tinged with red when they first appear, bright red-brown, lustrous and marked by many small pale lenticels at the end of their first season, becoming darker and gray or reddish brown the following year, and armed with many stout, nearly straight or slightly curved bright red-brown shining spines 3.5-5 cm. in length. Flowers from the 20th to the end of May. Fruit ripens about the 10th of October.

Rochester; common north and south of the city along the river banks, *John Dunbar*, May, 1900, *C. S. Sargent*, September 19, 1900, *John Dunbar*, May and September, 1901, October, 1902; *Niagara Falls*, New York, *C. S. Sargent*, September, 1900.

***Crataegus opulens*, n. sp.**

Glabrous, with the exception of the hairs on the upper surface of the young leaves and petioles. Leaves oblong-ovate to oval, acuminate, full and rounded or broadly cuneate at the entire base, sharply doubly serrate above, with straight gland-tipped teeth, and slightly divided into three or four pairs of broad acuminate spreading lobes; about half grown when the flowers open, and then very thin, light yellow-green and roughened above by short pale hairs and paler below; at maturity coriaceous, glabrous, dark bluish green and lustrous on the upper surface, very pale blue-green on the lower surface, 4-7 cm. long, 3-5

cm. wide, with thin yellow midribs sometimes tinged with rose-color in the autumn and four or five pairs of slender primary veins arching obliquely to the points of the lobes; petioles slender, more or less wing-margined at the apex, grooved, sparingly hairy when they first appear, with long white caducous hairs, occasionally glandular early in the season, with small scattered dark glands, 2-4 cm. in length; stipules linear to linear-falcate, acuminate, sometimes lobed at the base, glandular, mostly deciduous before the flowers open; leaves on vigorous leading shoots coarsely serrate, frequently three-lobed, the lateral lobes laterally divided into two or three pairs of secondary lobes, 6-8 cm. long and often as wide or wider than long, their petioles stout, usually about 2 cm. long and conspicuously glandular throughout the season. Flowers 1.2-1.4 cm. in diameter on long slender pedicels, in compact usually 5-8-flowered thin-branched compound corymbs; bracts and bractlets oblong-obovate to linear, acuminate, glandular, mostly deciduous before the flowers open; calyx-tube broadly obconic, the lobes gradually narrowed from the base, acuminate, tipped with minute dark red glands, sparingly glandular-serrate, usually only above the middle, or nearly entire, reflexed after anthesis; stamens 10; anthers pale rose color; styles 3 or 4, surrounded at the base by a narrow ring of pale hairs. Fruit on long slender reddish pedicels, in few-fruited drooping clusters, subglobose and rather broader than high to short-obovate, obscurely angled, crimson, slightly pruinose, lustrous, marked by few large dark dots, 1.3-1.5 cm. in diameter; calyx sessile, with a deep narrow cavity and erect or spreading entire or slightly serrate lobes, dark red on the upper side below the middle, their tips often deciduous from the ripe fruit; flesh thin, nearly white, dry, firm and sweet; nutlets 3 or 4, usually 4, full and rounded at the apex, gradually narrowed to the rounded base, prominently ridged on the back, with a high rounded ridge, 8-9 mm. long and often 6 mm. thick.

A shrub 3-5 m. in height, with dull olive-gray stems, ashy gray at the base, and slender only slightly zigzag branchlets, light red or green tinged with red and marked by small pale lenticels when they first appear, dark olive-brown and lustrous at the end of their first season, becoming light gray-brown the following year, and armed with many straight or slightly curved lustrous, purplish brown spines 3.5-5 cm. in length; winter-buds globose, 3-4 mm. in diameter, covered with bright red lustrous scales scarious on the margins. Flowers from the 20th to the end of May. Fruit ripens the middle of October. Late in the autumn the leaves turn dark red.

Rochester; only known along the banks of the river below Vincent Street, *John Dunbar*, May 28, 1900, *C. S. Sargent*, September 19, 1900, and September 29, 1902, *J. Dunbar*, May 23 and October 12, 1901; Buffalo, *J. Dunbar*, October 6, 1902.

***Crataegus Maineana*, n. sp.**

Glabrous with the exception of the hairs on the young leaves. Leaves ovate to deltoid or rarely rhombic, acuminate, rounded or concave-cuncate at the wide crenulate base, sharply doubly serrate above, with straight gland-tipped teeth and divided usually only above the middle into short broad acuminate lobes; more than half-grown when the flowers open and then very thin, light yellow-green and covered on the upper surface with short soft white hairs, and villose below along the base of the midribs and lowest veins; at maturity suboriaceous, glabrous, dark deep blue-green above, pale bluish green below, 5-6.5 cm. long, from 4-6 cm. wide, with thin yellow midribs and usually 4 pairs of thin primary veins extending obliquely to the points of the lobes; petioles very slender, narrowly wing-margined sometimes nearly to the middle, glandular with minute dark persistent glands, 3-4 cm. in length; stipules linear, acuminate, glandular, usually deciduous before the flowers open; on vigorous leading shoots, leaves ovate, rounded, truncate or slightly cordate at the base, deeply divided into 3 or 4 pairs of lateral lobes, coarsely serrate, often 6-7 cm. long and wide and frequently wider than long. Flowers 2 cm. in diameter on long slender glandular pedicels, in broad compact many-flowered compound corymbs; bracts and bractlets linear, acuminate, glandular, small, generally persistent until the flowers open; calyx-tube broadly obconic, the lobes wide, acuminate, entire or occasionally furnished with small lateral stipitate bright red glands, reflexed after anthesis; stamens 10; anthers dark purple; styles 4, surrounded at the base at a broad band of pale tomentum. Fruit on elongated, reddish pedicels, conspicuously glandular, with large oblong dark glands, in few-fruited drooping clusters, globose, deeply depressed at the base at the insertion of the stalk, dark scarlet, lustrous, marked by occasional large light spots, scarcely pruinose, about 1.5 cm. in diameter; calyx, cavity very broad and shallow, the bottom covered with a thick coat of hoary tomentum, the lobes nearly triangular from wide bases, bright red on the upper side below the middle, spreading and appressed; flesh thin, yellow, sweet, firm and hard; nutlets 4, prominently grooved on the back, with a narrow rounded groove, 6 mm. in length.

A treelike shrub often 4 or 5 m. in height with stout intricately branched stems covered with dark bark, spreading into wide thickets, small erect branches and slender slightly zigzag branchlets light orange-green and marked by small pale lenticels when they first appear, bright red-brown and lustrous at the end of their first season, becoming light reddish brown the following year and armed with very slender straight or slightly curved bright red-brown shining spines 4-6 cm. in length. Flowers from the 20th to the end of May. Fruit ripens the middle of October. The leaves turn to handsome bronze-red in the autumn.

Rochester; only in the northwestern part of the city, *John Dunbar*, October 10, 1900, May and September, 1901, October, 1902, *C. C. Laney*, October, 1902; Adams Basin, New York, *M. S. Baxter*, May 29, 1902; Buffalo, *John Dunbar*, October, 1902.

This species is named for Henry Clay Maine of Rochester, an interested observer of *Crataegus* in the valley of the Genesee River.

§ INTRICATAE.

Fruit medium size, orange-red or crimson; nutlets 2-5, ridged on the back; corymbs few-flowered; stamens 10 or less; anthers yellow.

Leaves oblong-ovate to oval; mature leaves smooth; stamens 10; fruit subglobose, orange-red.

11. *C. Baxteri*.

Leaves oblong to obovate; mature leaves scabrate; stamens 7; fruit oblong to oblong-obovate, crimson.

12. *C. verecunda*.

Crataegus Baxteri, n. sp.

Glabrous with the exception of a few caducous hairs on the upper surface of the unfolding leaves and young petioles. Leaves oblong-ovate to oval, acuminate, concave-cuneate, rounded or on leading shoots sometimes truncate at the entire or crenulate base, finely doubly serrate above, with straight gland-tipped teeth, and divided into short broad acute lateral lobes; when they unfold furnished on the upper surface with a few long white caducous hairs and nearly fully grown when the flowers open and then membranaceous, nearly glabrous, dark yellow-green above, pale below; at maturity smooth and coriaceous, dull dark bluish green on the upper surface, pale on the lower surface, slightly concave by the infolding of the margins, 4.5-6.5 cm. long;

4-6 cm. wide, with stout midribs deeply impressed on the upper side and usually rose-colored below late in the season, and 3-5 pairs of thin primary veins arching obliquely to the points of the lobes; petioles slender, more or less wing-margined at the apex by the decurrent base of the leaf-blades, grooved, sparingly hairy early in the spring, glandular, with numerous small dark persistent glands, 1.5-3 cm. in length. Flowers about 1.8 cm. in diameter on short stout pedicels, in narrow compact 3-10, usually 5 or 6-flowered compound corymbs; bracts and bractlets oblong-obovate, acuminate, very glandular, large and conspicuous, often deciduous before the flowers open; calyx-tube broadly obconic, the lobes gradually narrowed from wide bases, broad, acuminate, coarsely glandular-serrate, usually only above the middle, reflexed after anthesis; stamens 10; anthers large, pale yellow; styles 4 or 5, surrounded at the base by a broad ring of pale hairs. Fruit on short stout reddish pedicels, in few-fruited erect clusters, subglobose, flattened at the ends, concave at the base at the insertion of the stalk, bright orange-red, lustrous, marked by numerous large pale dots, about 1.5 cm. in diameter; calyx prominent, with a broad deep cavity, and wide lobes gradually narrowed into the long slender acuminate glandular-serrate reflexed and closely appressed tips often deciduous from the ripe fruit; flesh thin, hard and dry, greenish yellow; nutlets 4 or 5, broad, obtuse at the narrowed ends, ridged and slightly grooved on the back, about 7 mm. long and 5 mm. high.

An intricately branched shrub 3 or 4 m. in height with numerous stout stems covered with dark scaly bark, and erect and spreading branches forming a broad round-topped head, and slender only slightly zigzag branchlets, orange-green and marked by numerous large pale lenticels when they first appear, light red-brown and lustrous at the end of their first season, becoming light gray the following year, and armed with many slender or stout nearly straight bright red-brown shining spines 2.5-4 cm. in length. Flowers from the end of May to the 10th of June. Fruit ripens the middle of October and does not fall until the last of October or the first of November. In the autumn the leaves turn a handsome yellowish red color and fall about the 1st of November.

Rochester; common north of the city on both sides of the river, *C. C. Laney*, May 28, June and October, 1900, *C. S. Sargent*, September, 1900, and September, 1902, *John Dunbar*, October, 1901, 1902; Honeoye Lake, August, 1902, *M. S. Baxter*; common at

Chapinsville, New York, *C. S. Sargent*, October, 1902; Chippewa, Ontario, *John Dunbar*, October 15, 1902.

This distinct and handsome species which is particularly beautiful in spring when the branches are entirely covered with the abundant clusters of large flowers, is named for Milton Stephen Baxter, of Rochester, an enthusiastic and careful student of *Crataegus*.

***Crataegus verecunda*, n. sp.**

Glabrous with the exception of the hairs on the young leaves and on the inner face of the calyx-lobes. Leaves oblong-obovate or rarely oval, acute or acuminate, gradually narrowed from near the middle, and concave-cuneate at the entire glandular or crenate base, finely doubly serrate above, with straight gland-tipped teeth, and divided above the middle into several short broad acute lobes; slightly tinged with red and sparingly villose on the upper surface as they unfold, and nearly fully grown when the flowers open and then very thin, nearly glabrous and dark yellow-green above and pale below; at maturity thin, scabrate, light bluish-green on the upper surface, pale on the lower surface, 5-6 cm. long, 3.5-4 cm. wide, with slender yellow midribs and 4 or 5 pairs of thin primary veins; petioles slender, more or less wing-margined by the decurrent bases of the leaf-blades, grooved, sparingly glandular, with minute mostly deciduous glands, from 1.5-2 cm. in length; leaves on vigorous shoots usually broadly ovate, acute, concave-cuneate at the base, deeply divided into 3 or 4 pairs of broad lateral lobes, 6-7 cm. long, from 5.5-6.5 cm. wide, with stout very glandular petioles usually wing-margined to below the middle and generally rose color in the autumn. Flowers about 1.4 cm. in diameter on long slender pedicels, in compact usually 6-10-flowered thin-branched compound corymbs; bracts and bractlets oblong-obovate to linear, acuminate, coarsely glandular-serrate, large and conspicuous, generally deciduous before the flowers open; calyx-tube narrowly obconic, the lobes abruptly narrowed at the base, long-acuminate, coarsely glandular-serrate above the middle, villose on the inner surface, reflexed after anthesis; stamens 7; anthers small, creamy white; styles 2 or 3. Fruit on slender drooping pedicels, in few-fruited clusters, oblong to oblong-obovate, about 1 cm. long and 7 mm. wide; calyx prominent, with a short tube, a deep narrow cavity, and reflexed lobes mostly deciduous from the ripe fruit; flesh thin, yellow, dry and mealy; nutlets 2 or 3, thick, acute at the ends, prominently ridged on the back, with a high rounded ridge, 7 mm. long.

A shrub rarely more than 1 m. in height with slender stems, erect branches and thin only slightly zigzag branchlets, dark orange-green and marked by numerous pale lenticels when they first appear, bright red-brown and lustrous at the end of their first season, becoming dull and darker the following year, and armed with slender slightly curved dark purple shining spines from 3.5 to 4 cm. in length and pointed toward the base of the branch. Flowers during the first week of June. Fruit ripens at the end of September or early in October. The leaves turn yellow and fall by the middle of October.

Rochester; known only in Seneca Park, east, *John Dunbar* and *H. T. Brown*, June 3, 1901, *John Dunbar*, October, 1901, *C. S. Sargent*, October, 1902, *C. C. Laney*, October, 1901.

§ PUNCTATAE.

Fruit large, oblong, red or yellow, conspicuously punctate; nutlets usually 5, prominently ridged on the back; corymbs many-flowered; stamens 20.

Leaves obovate-cuneiform; anthers rose color or yellow; fruit, red or yellow on different individuals.

13. *C. punctata*.

Crataegus punctata, Jacquin. Sargent *Silva N. Am.*, iv. 103, t. 84. Common.

The yellow-fruited form is

Crataegus punctata, β *aurea*, Aiton, *Hort. Kew.* ii. 170 (not *Crataegus aurea*, Marshall) (1789):

Crataegus crocata, Ashe, *Ann. Carnegie Mus.* i. 389 (1902).
Genesee Valley Park, Rochester, N. Y.

§ MOLLES.

Fruit large, subglobose to short-oblong or pyriform, usually scarlet and lustrous, often edible; nutlets 3-5, thin, pointed at the ends, obscurely grooved, or slightly ridged on the back; corymbs generally wide and many-flowered, tomentose or villose; leaves broad, rounded, cuneate or cordate at the base.

ANTHERS ROSE COLOR.

Stamens 20.

Leaves ovate to oval, only slightly pubescent; fruit short-oblong; nutlets 4-5. 14. *C. Fulleriana*.

Stamens 10,

Leaves oval, rounded or broadly cuneate at the base, their stipules persistent during the season; fruit oblong; nutlets 3-5. 15. *C. Ellwangeriana*.

Leaves oval, thin, drooping and often convex; fruit oblong; dull dark red; nutlets 3-5. 16. *C. Pringlei*.

Leaves oblong-ovate, broadly cuneate or rarely cordate at the base; corymbs very compact, few-flowered; fruit oblong to obovate; nutlets 4-5. 17. *C. spissiflora*.

Crataegus Fulleriana, n. sp.

Leaves ovate to oval, acute or acuminate or rounded at the apex, rounded or cuneate at the entire base, very sharply serrate above, with straight gland-tipped teeth, and divided into numerous narrow acuminate spreading lobes; about half grown when the flowers open, and then membranaceous, roughened above by short pale hairs and pubescent along the midribs and veins below; at maturity very thin, dark yellow-green and scabrate or nearly smooth on the upper surface, paler and glabrous on the lower surface, 5-6 cm. long, 4-5 cm. wide, with thin midribs and primary veins; petioles slender, slightly wing-margined at the apex, grooved, densely villose early in the season, sparingly villose, or pubescent in the autumn, 2.5-3 cm. in length; stipules linear, acuminate, sometimes lobed at the base, glandular, mostly deciduous before the flowers open; on vigorous leading shoots leaves broadly ovate, more deeply lobed than the leaves of fertile branchlets, often 8-9 cm. long and wide. Flowers 2 cm. in diameter on long slender densely villose pedicels, in wide compact many-flowered hairy compound corymbs; bracts and bractlets oblong-

obovate, acute, glandular, large and conspicuous, mostly persistent until the flowers open; calyx-tube narrowly obconic, covered with a thick coat of matted white hairs, the lobes abruptly narrowed from the base, slender, acuminate, entire, glabrous on the outer, deeply villose on the inner face, reflexed after anthesis; stamens 20; anthers rose color; styles 4 or 5, surrounded at the base by a narrow ring of pale tomentum. Fruit on slender elongated slightly hairy pedicels, in few-fruited drooping clusters, short-oblong, scarlet, lustrous, marked by large pale dots, 1.5-1.6 cm. long, about 1.2 cm. wide; calyx sessile, with a broad shallow cavity and small linear spreading and appressed lobes villose on the upper surface; flesh thin, yellow, dry and mealy; nutlets 4 or 5, thin, acute at the ends, irregularly ridged on the back, with a usually high narrow ridge, about 7 mm. long.

A shrub or rarely a small tree 4-6 m. in height, with a stem occasionally 2 dm. in diameter at the ground, remote ascending branches, and slender only slightly zigzag branchlets densely villose when they first appear, soon becoming glabrous, dull red-brown and marked by numerous elliptical or oval pale lenticels at the end of their first season, dark brown tinged with red the following year, and armed with many very slender nearly straight dark purple shining spines 2-7 cm. in length. Flowers at the end of May. Fruit ripens at the end of September.

Rochester; Vincent Street bridge, east side of the river north of the city, *J. Dunbar*, May 28 and September 28, 1901, *C. S. Sargent*, September 29, 1902; Rush and Rochester Junction, common in rich soil, *M. S. Baxter and John Dunbar*, August, 1902.

This species is named for Joseph B. Fuller, long a careful and zealous student of the flora of the Genesee Valley, and curator in botany of the Rochester Academy of Science.

Crataegus Ellwangeriana, Sargent, *Bot. Gazette*, xxxiii. 1184 (1902); *Silva N. Am.* xiii. 109, t. 671.

A common species in Monroe and Ontario Counties.

Crataegus Pringlei, Sargent, *Rhodora*, iii. 21 (1901); *Silva N. Am.* xiii. 111, t. 672.

A few specimens are known north and south of the city.

Crataegus spissiflora, *n. sp.*

Leaves oblong-ovate, acute or acuminate, rounded, broadly cuneate or rarely cordate at the entire base, sharply doubly serrate above, with slender straight gland-tipped teeth, and deeply divided

into numerous broad acute or acuminate lateral lobes ; when they unfold villose above and densely tomentose below, and about one-half grown when the flowers open and then roughened above by short rigid white hairs and pubescent below along the midribs and veins ; at maturity dark yellow-green and scabrate on the upper surface, glabrous on the lower surface, 7-8 cm. long, 4.5-8 cm. wide, with slender midribs and 4 or 5 pairs of prominent veins running obliquely to the points of the lobes ; petioles slender, more or less wing-margined at the apex by the decurrent base of the leaf-blades, slightly grooved, sparingly glandular, villose early in the season, becoming glabrous and rose color in the autumn, 2.5-3 cm. in length ; stipules lanceolate, glandular, often lobed at the base, 1-1.5 cm. long, usually deciduous before the flowers open ; on vigorous leading shoots leaves cordate or rarely cuneate at the base, deeply lobed, 1-1.2 dm. long, 8-10 dm. wide, with stout conspicuously glandular petioles and foliaceous lunate coarsely glandular-serrate stipules often 1 cm. in length. Flowers 1.2 cm. in diameter on short slender villose pedicels, in small very compact few usually 4-6 flowered thin-branched hairy corymbs ; bracts and bractlets oblong-obovate, acuminate, glandular, mostly deciduous before the flowers open ; calyx-tube narrowly obconic, coated with long matted white hairs, the lobes slender, acuminate, finely glandular-serrate, glabrous on the outer, villose on the inner surface, reflexed after anthesis ; stamens 10 ; anthers dark rose color ; styles 4 or 5, surrounded at the base by a narrow ring of pale tomentum. Fruit on short reddish pubescent pedicels, in compact drooping clusters, oblong to oblong-obovate, scarlet, lustrous, marked by many small pale dots, 1.8-2 cm. long, 1.5 cm. wide ; calyx small, with a narrow shallow cavity and spreading sharply serrate lobes often deciduous from the ripe fruit ; flesh thick, yellow, dry and mealy ; nutlets 4 or 5, thin, acute at the ends, rounded and only slightly grooved on the back, 8 mm. in length.

A shrub with numerous erect stems 3-4 m. in height, covered with smooth pale gray bark, and forming a compact oblong round-topped bush ; branchlets stout, erect, slightly zigzag, dark red-brown and sparingly villose when they first appear, soon glabrous, bright red-brown, very lustrous and marked by many small pale lenticels at the end of their first season, becoming dark gray or gray-brown the following year, and armed with few stout spreading bright chestnut-brown shining ultimately gray spines 3-4 cm. long. Flowers about the 20th of May. Fruit becoming bright red at the end of August,

does not ripen until the end of September or the beginning of October and then soon falls.

Rochester ; banks of the Genesee River, Genesee Valley Park, *John Dunbar*, May, August and September, 1901, October 9, 1902, *C. S. Sargent*, September 29, 1902.

§ DILATATAE.

Fruit medium size to large, subglobose, scarlet ; fruit-calyx much enlarged, the lobes dark red on the upper side toward the base ; nutlets 5, ridged on the back ; corymbs few or many-flowered ; stamens 20 ; anthers rose color ; leaves membranaceous, on vigorous shoots as broad or broader than long.

Leaves ovate ; corymbs many-flowered, glabrous ; fruit medium size, persistent until winter.

18. *C. Durobrivensis*.

Crataegus Durobrivensis, Sargent, *Trees and Shrubs*, i. 3, t. 2 (1902).

Rochester ; steep banks of the Genesee River north of the city ; banks of the Niagara River, Niagara Falls, New York, *C. S. Sargent*, September, 1901 ; Buffalo, New York, *John Dunbar*, September, 1901.

§ LOBULATAE.

Fruit large, oblong, scarlet ; nutlets 3-5, prominently grooved or sometimes ridged on the back ; corymbs many-flowered, glabrous or villose ; stamens 5-10 ; anthers rose color ; leaves large, membranaceous.

Leaves oval to ovate, light yellow-green ; corymbs sparingly villose or glabrous ; stamens usually 5 ; nutlets 3.

19. *C. Holmesiana*.

Leaves ovate-oblong, dark yellow-green ; corymbs densely villose ; stamens usually 5 ; nutlets 5.

Leaves broadly ovate to oval, dark green ; corymbs slightly villose ; stamens 10 ; nutlets 2.

21. *C. pedicellata*.

Crataegus Holmesiana, Ashe, *Jour. Elisha Mitchell Sci. Soc.* xvi. pt. ii. 78 (1900). Sargent, *Bot. Gazette*, xxxi. 10 ; *Silva N. Am.* xiii. 119, t. 676.

This species as it grows at Rochester and is common near Toronto and in the neighborhood of Montreal differs from *Crataegus Holmesiana*

as figured in *The Silva of North America* in its sometimes slightly hairy corymbs, in its rather larger flowers and in its later-ripening and longer-hanging fruits. (See Sargent, *Rhodora*, v. 112 [1903]).

Rochester ; *C. S. Sargent*, October 19, 1902, *John Dunbar*, May and September, 1901, September, 1902, *C. C. Laney*, May and September, 1901, *M. S. Baxter*, May and September, 1901 ; Ogden, N. Y., *Henry T. Brown*, October 10th, 1902.

***Crataegus acclivis*, n. sp.**

Leaves ovate-oblong, acuminate, broadly cuneate or rounded at the entire base, coarsely doubly serrate above, with straight gland-tipped teeth, and deeply divided into numerous wide-spreading acuminate lateral lobes ; when they unfold tinged with red, densely villose on the upper surface and pubescent along the midribs and veins below, and about half grown when the flowers open and then light yellow-green, slightly roughened above by short white hairs and pubescent along the midribs and veins below ; at maturity membranaceous, dark yellow-green and nearly smooth above, pale yellow-green and glabrous below, 6-7.5 cm. long, 4.5-6 cm. wide, with stout yellow midribs and 5 or 6 pairs of thin primary veins extending obliquely to the points of the lobes ; petioles slender, slightly wing-margined at the apex, grooved, glandular, with numerous small dark glands, densely villose early in the season, becoming puberulous or glabrous in the autumn, 3.5-5 cm. in length ; stipules linear, acuminate, glandular, mostly deciduous before the flowers open ; on vigorous leading shoots leaves broadly ovate, acuminate, cordate at the wide base, deeply divided into wide acute lateral lobes often 10-11 cm. long and wide, their stipules foliaceous, lunate, coarsely glandular-serrate, 1-1.5 cm. wide, persistent through the season. Flowers about 1.6 cm. in diameter on slender densely villose pedicels, in broad lax many-flowered long-branched hairy compound corymbs, the lower peduncles from the axils of the upper leaves and often several-flowered ; bracts and bractlets lanceolate, glandular, large and conspicuous, persistent until after the flowers open ; calyx narrowly obconic, covered with a thick coat of long matted hairs, the lobes slender, elongated, acuminate, serrate, with occasional large gland-tipped teeth, glabrous on the outer, slightly villose on the inner surface, reflexed after anthesis ; stamens usually 5 ; anthers pink ; styles mostly 5. Fruit hanging on long slender slightly hairy pedicels, in many-fruited drooping clusters, short-oblong, full and rounded at the ends, yellowish red, glaucous,

marked by occasional pale dots, about 1.5 cm. long and 1.2 cm. wide ; calyx sessile with a broad shallow cavity and usually erect, enlarged coarsely serrate lobes villose on the upper side and often deciduous from the ripe fruit ; flesh thick, yellow, rather juicy ; nutlets usually 5, acute at the ends, ridged with a high broad ridge or rounded and slightly grooved on the back, 7-9 mm. in length.

A tree 8-10 m. in height with a short trunk occasionally 1 dm. in diameter covered with smooth light gray bark, numerous erect branches forming an oblong open very irregular head, and stout slightly zigzag branchlets coated when they first appear with long matted pale hairs, light red-brown, lustrous, marked by small pale lenticels and pubescent at the end of their first season, becoming dull red or orange-brown the following year, and armed with stout straight or slightly curved bright red-brown shining spines from 3 to 5 cm. long. Flowers during the last week of May. Fruit ripens the middle of September and soon falls.

Rochester ; steep banks of the gorge of the Genesee River ; common, *C. S. Sargent*, September 19, 1900, *John Dunbar*, May and September, 1901, September, 1902 ; *Rush, M. S. Baxter*, June, 1902 ; Niagara Falls, New York, *C. S. Sargent*, September 21, 1900.

Crataegus pedicellata, *Sargent, Bot. Gazette*, xxxi. 226 (1901) ; *Silva N. Am.* xiii. 121, t. 677.

One of the largest and most beautiful Thorn-trees of the northern United States. Common throughout Monroe and Ontario Counties. Abundant at Chippewa, Ontario.

§ TENUIFOLIAE.

Fruit medium size, oblong, pyriform or rarely subglobose, crimson or scarlet, usually lustrous ; nutlets 2-5, generally ridged on the back ; corymbs usually many-flowered, glabrous or slightly villose ; stamens 5-20 ; anthers red, pink or rose color ; leaves membranaceous, rarely becoming thick in the autumn, usually villose on the upper surface while young, smooth or rarely scabrate at maturity.

Stamens less than 10.

Leaves oblong-ovate to oval, dark bluish green, becoming thick in the autumn ; stamens 5 ; anthers pink ; fruit oblong-obovate, crimson ; nutlets 2-5. 22. *C. parviflora*.

Leaves ovate, dark green, conspicuously wrinkled ; stamens 7-10 ; anthers rose color ; fruit oblong, scarlet ; nutlets 3-4. 23. *C. Streeterae*.

Leaves oblong-ovate, light yellow-green, glaucous on the upper surface at least while young ; stamens 7-9, rarely 10 ; anthers reddish purple ; fruit oblong, scarlet ; nutlets 3-4. 24. *C. glaucophylla*.

Stamens 10.

Leaves oblong-ovate, dark blue-green ; anthers rose color ; fruit oblong, scarlet ; nutlets 2-4. 25. *C. ornata*.

Leaves oblong-ovate, pale yellow-green, scabrate on the upper surface ; corymbs slightly villose ; anthers light rose color ; fruit oblong, scarlet ; flesh red ; nutlets 2-3. 26. *C. rubicunda*.

Leaves broadly ovate, dark blue-green, corymbs few-flowered ; anthers deep rose color ; fruit oblong-obovate ; nutlets 2-3. 27. *C. tenuiloba*.

Leaves oblong-ovate, deeply tinged with red while young, dark yellow-green at maturity ; anthers deep rose color ; fruit obovate, crimson ; nutlets 3-4.

28. *C. colorata*.

Leaves ovate, dull dark bluish green ; anthers deep rose color ; fruit usually subglobose, crimson ; nutlets 5.

29. *C. Beckwithiae*.

Leaves ovate, dark yellow-green ; anthers rose color ; fruit oblong, crimson, ripening in August ; nutlets 3-4.

30. *C. matura*.

Leaves ovate to oval or suborbicular, dark olive green, thick at maturity ; anthers rose color ; fruit subglobose, crimson ; nutlets 3-4. 31. *C. Dunbari*.

Stamens 20.

Leaves oblong-ovate, dull dark bluish green and scabrate on the upper surface ; anthers red or deep rose color ; fruit oblong, dull scarlet ; nutlets 3-4, usually 4.

32. *C. benigna*.

Crataegus parviflora, n. sp.

Glabrous with the exception of the hairs on the upper surface of the young leaves. Leaves oblong-ovate to oval and on vigorous shoots often deltoid, long-pointed and acuminate at the apex, gradually narrowed and cuneate or rounded at the entire base, sharply

often doubly serrate above, with gland-tipped teeth and deeply divided, generally only above the middle, into 3 or 4 pairs of broad acuminate spreading lobes ; about one-third grown when the flowers open and then membranaceous, dark yellow-green and roughened above by short pale hairs and glabrous below ; at maturity thick, dark bluish green and smooth on the upper surface, pale and glaucous on the lower surface, 5-6. 5 cm. long, 4-5 cm. wide, with slender yellow midribs and 4 or 5 pairs of thin primary veins arching obliquely to the points of the lobes ; petioles slender, slightly grooved, 2-3 cm. in length. Flowers about 1 cm. in diameter on long slender pedicels, in wide loose many-flowered thin-branched compound corymbs ; bracts and bractlets linear, glandular, small, mostly deciduous before the flowers open ; calyx narrowly obconic, the lobes very slender, acuminate, entire or rarely sparingly serrate, reflexed after anthesis ; stamens usually 5 ; anthers small, dark pink ; styles 2 or 3. Fruit drooping on long slender pedicels, in many-fruited clusters, oblong-obovate, gradually narrowed and tapering below, crimson, lustrous, marked by numerous small pale dots, from 1.2-4 cm. long, about 1 cm. wide ; calyx small, with a narrow shallow cavity and erect incurved lobes, bright red on the upper side below the middle, usually persistent on the ripe fruit ; flesh thin, yellow, dry and mealy ; nutlets 2 or 3, broad full and rounded at the apex, gradually narrowed and acute at the base, ridged on the back, with a wide deeply grooved ridge, 7-8 mm. long.

A shrub or slender tree 6-8 m. in height with a stem occasionally 2-3 m. long and 1.5-2 dm. in diameter, covered with close scaly dull ashy gray bark, small erect and spreading branches furnished with many short spine-like lateral branchlets, forming a somewhat oblong head, and slender nearly straight terminal branchlets, light orange-green and marked by numerous small pale lenticels when they first appear, dull orange or reddish brown at the end of their first year, becoming dark gray the following season and armed with occasional stout nearly straight bright red-brown shining spines 2.5-3 cm. in length, rarely persistent on old stems. Flowers at the end of May and during the first week of June. Fruit ripens toward the middle of October and falls about the end of the month.

Rochester, *C. S. Sargent*, *John Dunbar*, *C. C. Laney*, September, 1900, *John Dunbar*, June 3 and October 15, 1901, *C. S. Sargent*, September 29, 1902 ; Rush. New York, *M. S. Baxter*, September, 1902.

Crataegus Streeterae, n. sp.

Leaves ovate, acuminate and often long-pointed at the apex, rounded, truncate or abruptly cuneate at the wide entire base, sharply and often doubly serrate above, with long slender spreading gland-tipped teeth, and slightly divided into 3 or 4 pairs of small acuminate lobes; more than half grown when the flowers open and then very thin, light yellow-green and roughened on the upper surface by short white hairs; at maturity thin, conspicuously wrinkled, dark green and scabrate above, pale and glaucous below, 3.5-5 cm. long, 3-4.5 cm. wide, with very thin midribs and primary veins; petioles slender, slightly grooved, pubescent when they first appear, soon glabrous, 2.5-3 cm. in length; on vigorous leading shoots, leaves long-pointed, cordate at the base, often 6 cm. long and broad, their petioles short and stout, conspicuously glandular throughout the season. Flowers 1.2-1.4 cm. in diameter on long very slender puberulous pedicels, in compact many-flowered thin-branched compound corymbs; calyx-tube narrowly obconic, the lobes slender, acuminate, entire, glabrous on the outer, slightly villose on the inner surface, reflexed after anthesis; stamens 7-10; anthers small, rose color; styles 3 or 4, surrounded at the base by narrow ring of pale tomentum. Fruit on slender pedicels, in drooping many-fruited clusters, oblong, full and rounded at the ends, scarlet, lustrous, marked by many small pale dots, about 1 cm. long and 8 cm. wide; calyx sessile, with a broad shallow cavity, and only slightly enlarged reflexed and closely appressed lobes, their tips often deciduous from the ripe fruit; flesh thick, yellow, dry and mealy; nutlets 3 or 4, wide, full and rounded at the ends, conspicuously ridged on the back, with a broad high ridge, 6.5-7 mm. long.

A dense shrub with numerous stems covered with smooth, dull gray bark, the lower horizontal, the upper ascending, and slender nearly straight branchlets, tinged with red when they first appear, dull gray or reddish brown and marked by numerous small pale lenticels at the end of their first season, becoming ashy gray the following year, and armed with few slender, slightly curved, dark red shining spines 3-4 cm. in length. Flowers about the 20th of May. Fruit ripens toward the end of September or the first of October and then remains on the branches for several weeks.

Rochester; Oak Hill, *John Dunbar*, May, September and October, 1901, along the river banks, Genesee Valley Park, *M. S. Baxter* and *John Dunbar*, August, 1902.

This species is named in memory of Mary Elizabeth Streeter, to

whose enthusiasm and persistent labors the now important botanical section of the Rochester Academy of Science largely owes its existence.

Crataegus glaucophylla, Sargent, *Rhodora*, v. 140 (1903).

Rochester; common on both sides of the Genesee River, *John Dunbar*, June and September, 1901, September and October, 1902, *C. S. Sargent*, September, 1902.

Crataegus ornata, *n. sp.*

Leaves oblong-ovate, acuminate, gradually narrowed and rounded or broadly cuneate at the entire or crenulate base, sharply and doubly serrate above, with straight gland-tipped teeth, and deeply divided usually only above the middle into numerous narrow acuminate spreading lobes; tinged with red and covered on the upper side with short, rigid shining hairs when they unfold, and more than half grown when the flowers open and then membranaceous, light yellow-green and scabrate on the upper surface, and pale and glabrous on the lower surface; at maturity thin but firm in texture, dark blue-green and smooth above, pale bluish green below, 5-7 cm. long, 4-6 cm. wide, with thin midribs and primary veins; petioles slender, grooved, sparingly glandular, 4-6 cm. in length; stipules glandular, usually caducous before the flowers open; on vigorous leading shoots, leaves broadly ovate, cordate at the base, deeply divided into numerous broad acuminate lateral lobes, often 8-10 cm. long and 7-8 cm. wide, their stipules foliaceous, lunate, very coarsely serrate, early deciduous. Flowers about 1.2 cm. in diameter on long very slender glabrous pedicels, in wide many-flowered compound corymbs; bracts and bractlets linear, glandular-serrate, usually deciduous before the flowers open; calyx narrowly obconic, glabrous, the lobes slender, acuminate, entire or slightly crenulate on the margins, usually red at the apex, reflexed after anthesis; stamens 10; anthers rose color; styles 2-4, surrounded at the base by a ring of long pale hairs. Fruit on long slender pedicels, in wide lax drooping showy many-fruited clusters, oblong, full and rounded at the ends, scarlet, lustrous, 1.2-1.4 cm. long, 9-10 mm. broad; calyx sessile, with a narrow shallow cavity and much enlarged, erect or slightly spreading lobes usually persistent on the ripe fruit; flesh thin, yellow, dry and mealy; nutlets 2-4 broad, rounded and obtuse at the ends, prominently ridged on the back, with a high rounded ridge, 7 mm. in length.

A broad much branched shrub 4 or 5 m. in height, with numerous erect stems and branches covered with dull gray bark, and very slender

virgate branchlets, light orange-green when they first appear, dull light gray-brown at the end of their first season, becoming pale gray-brown the following year, and armed with few slender straight, or slightly curved dark chestnut-brown shining spines 4-5 cm. long; winter-buds globose, appearing pale by the production of the light yellow inner scales beyond the bright red-brown lustrous outer scales, rarely more than 1.5 mm. in diameter. Flowers from the 20th to the 25th of May. Fruit ripens at the end of September and does not fall until after the middle of October.

Rochester, *John Dunbar*, May 24, 1900, *C. S. Sargent*, September 18, 1900, May, September and October, 1901, October, 1902; La Salle, New York, *John Dunbar*, September, 1902.

Crataegus rubicunda, n. sp.

Leaves oblong-ovate, long-pointed and acuminate at the apex, concave-cuneate or rounded at the entire base, sharply doubly serrate above, with gland-tipped teeth, and deeply divided into 4 or 5 pairs of lateral lobes: more than half grown when the flowers open and then roughened above by short pale hairs and glabrous below; at maturity thin, light yellow-green and scabrate on the upper surface, paler on the lower surface, 5-6 cm. long, 4-4.5 cm. wide, with thin yellow mid-ribs and primary veins; petioles slender, slightly grooved, pubescent, soon glabrous, occasionally glandular early in the season, tinged with red in the autumn, 2-2.5 cm. in length. Flowers 1.2-1.4 cm. in diameter on long, slender, slightly hairy pedicels, in wide loose many-flowered thin-branched compound corymbs; bracts and bractlets linear, glandular, with minute dark glands, small, mostly deciduous before the flowers open; calyx-tube narrowly obconic, reddish, sparingly hairy toward the base, the lobes slender, acuminate, irregularly glandular-serrate or entire, bright red toward the apex, reflexed after anthesis; stamens 10; anthers small, pinkish purple; styles 2 or 3. Fruit on elongated reddish pedicels, in many-fruited drooping clusters, oblong, full and rounded at the ends, scarlet, lustrous, marked by numerous small pale dots, from 1.2 to 1.4 cm. long, about 8 mm. wide; calyx prominent with a broad shallow cavity and reflexed and closely appressed lobes bright red on the upper side near the base, their tips mostly deciduous from the ripe fruit; flesh thin, juicy, red; nutlets 2 or 3, full and rounded at the apex, gradually narrowed and acute at the base, prominently ridged on the back, with a high narrow rounded ridge, 7-8 mm. long.

A shrub 2-4 m. in height with slender much-branched stems covered with pale gray very smooth bark and thin slightly zigzag branchlets more or less deeply tinged with red, when they first appear light red-brown, very lustrous, and marked by numerous minute pale lenticels at the end of their first season, becoming reddish gray the following year and armed with many stout much curved bright red-brown shining spines 3-4 cm. in length. Flowers at the end of May. Fruit ripens the middle of September.

Rochester ; river Banks, Oak Hill, Genesee Valley Park, *John Dunbar*, May 31, 1900, May, 1901, September, 1902 ; Buffalo, *John Dunbar*, October, 1902.

Crataegus tenuiloba, n. sp.

Glabrous with the exception of the hairs on the upper surface of the young leaves. Leaves broadly ovate, acuminate, rounded, truncate or cuneate at the entire base, sharply doubly serrate above, with slender gland-tipped teeth and deeply divided into numerous acuminate spreading lateral lobes ; about half-grown when the flowers open and then very thin, light yellow-green and covered on the upper surface with short white hairs ; at maturity thin but firm in texture, dark bluish green, pale and glaucous below, 4-5 cm. long, 3-4 cm. wide, with slender yellow midribs and 3 or 4 pairs of primary veins ; petioles slender, grooved, occasionally glandular with minute dark scattered glands, 1.5-2.5 cm. in length ; on vigorous leading shoots leaves much thicker and more deeply lobed than the leaves of fertile branchlets, often cordate at the base, 6-7 cm. long and usually as wide, with short stout conspicuously glandular petioles wing-margined to below the middle and frequently rose-colored in the autumn. Flowers 1.5 cm. in diameter on long slender pedicels, in narrow few, usually 4-6-flowered thin-branched compound corymbs ; calyx narrowly obconic, the lobes elongated, very slender, acuminate, entire or very slightly serrate, tipped with minute dark glands, reflexed after anthesis ; stamens 10 ; anthers dark rose color ; styles 2-4. Fruit on slender reddish pedicels, in drooping few-fruited clusters, oblong-obovate, full and rounded at the apex, gradually narrowed to the base, scarlet, lustrous, 1.2-1.4 cm. long, 1 cm. wide ; calyx sessile, with a narrow shallow cavity and enlarged erect and incurved lobes usually persistent on the ripe fruit ; flesh thin, yellow, dry and mealy ; nutlets usually 2 or 3 thick, acute at the ends, prominently ridged on the back, with a broad rounded deeply grooved ridge, about 7 mm. long.

A shrub 3 or 4 m. in height with numerous erect stems covered with smooth pale gray bark, fastigate branches forming a narrow pointed head, and slender only slightly zigzag branchlets light red-brown when they first appear, dark reddish brown, lustrous, and marked by numerous small pale lenticels at the end of their first season, becoming dark reddish brown the following year, and armed with many stout, straight or slightly curved bright red-brown shining spines from 3.5-4 cm. in length and frequently long persistent; winter-buds appearing pale by the production of the light yellow inner scales beyond the brown outer scales. Flowers during the first week of June. Fruit ripens in October and falls toward the end of the month.

Rochester; open pastures and hillsides south of city, *John Dunbar*, *C. C. Laney*, *M. S. Baxter*, May and October, 1901, September, 1902, *C. S. Sargent*, September 1902.

Crataegus colorata, *n. sp.*

Glabrous with the exception of the hairs on the upper surface of the young leaves. Leaves oblong-ovate, acuminate, full and rounded or abruptly cuneate at the entire base, coarsely doubly serrate above, with straight gland-tipped teeth, and slightly divided into 4 or 5 pairs of short acuminate spreading lobes, deeply tinged with red and villose on the upper surface, with short white hairs when they first appear, and about half-grown when the flowers open and then very thin, light yellow-green more or less tinged with red, and still slightly hairy above; at maturity thin but firm in texture, dark yellow-green, smooth and lustrous on the upper surface, pale bluish green on the lower surface 6-8 cm. long, 5-6 cm. wide, with slender yellow midribs and 4 or 5 pairs of thin primary veins arching obliquely to the points of the lobes; petioles slender, slightly wing-margined at the apex, grooved, sparingly glandular, from 3 to 4 cm. in length; bracts and bractlets lanceolate to oblong-obovate, acute, glandular, bright red, large and conspicuous, mostly deciduous before the flowers open; on leading vigorous shoots leaves broadly ovate, acuminate, rounded or slightly cordate at the base, more coarsely serrate and more deeply lobed than the leaves of fertile branchlets, often 8-9 cm. long and wide, with very stout glandular petioles, becoming reddish toward the autumn, and large foliaceous lunate acuminate coarsely serrate persistent stipules. Flowers 1.5 cm. in diameter on long slender pedicels, in wide many-flowered thin-branched compound corymbs; bracts and bractlets lanceolate to linear, glandular, with small stipitate glands,

large, usually persistent until after the flowers open ; calyx-tube narrowly obconic, bright red, like the slender elongated acuminate entire or slightly serrate lobes, tipped with large dark red glands, reflexed after anthesis ; stamens 10 ; anthers small, dark rose color ; styles 3 or 4. Fruit on elongated slender reddish pedicels, in few-fruited drooping clusters, obovate, crimson, lustrous, marked by small pale dots, usually 1.2-1.5 cm. long and 1.2 cm. wide ; calyx prominent, with a broad deep cavity and spreading entire or slightly serrate lobes bright red on the upper side below the middle and usually persistent on the ripe fruit ; flesh thin, yellow, soft and succulent ; nutlets 3 or 4, broad, full and rounded at the apex, gradually narrowed to the acute base, ridged on the back, with a high rounded ridge, 7 mm. long.

A shrub 3 or 4 m. in height with numerous intricately branched stems, branches furnished with many short spine-like lateral branchlets, the lower horizontal and spreading, the upper ascending, and slender very zigzag terminal branchlets, bright red when they first appear, red brown, lustrous and marked by numerous small pale lenticels at the end of their first season and dark red-brown the following year, and armed with numerous stout or slender straight or occasionally slightly curved dull chestnut-brown spines 3-3.5 cm. in length. Flowers from the 20th to the end of May. Fruit ripens at the end of September and falls gradually through October.

Rochester ; common in the Genesee Valley, *John Dunbar* and *H. T. Brown*, 1900, *John Dunbar*, May, September and October, 1901, *C. S. Sargent*, September, 1902 ; Murray, New York, *M. S. Baxter*, October 11, 1902 ; Buffalo, October 6, 1902 ; Chippewa, Ontario, October 7, 1902, *John Dunbar*, near Toronto, Ontario, *D. W. Beadle*, May 20, 1902.

Crataegus Beckwithae, n. sp.

Leaves ovate, acute or acuminate, rounded, truncate, rarely cuneate, or on leading shoots subcordate at the wide entire or glandular base, sharply doubly serrate above, with gland-tipped teeth, and slightly divided into 3 or 4 pairs of short acuminate lateral lobes ; more than half grown when the flowers open and then membranaceous, light yellow-green, roughened above by short white hairs and glabrous below ; at maturity thin but firm in texture, dull dark bluish green, glabrous and smooth on the upper surface, pale bluish green on the lower surface, 4-6 cm. long and wide and often wider than long,

with slender yellow midribs deeply impressed above and 3 or 4 pairs of thin primary veins extending very obliquely to the points of the lobes; petioles stout, wing-margined sometimes nearly to the middle by the decurrent bases of the leaf-blades, grooved, conspicuously glandular, 1.5-3 cm. in length. Flowers about 1.8 cm. in diameter on long slender pedicels, in wide many-flowered thin-branched glabrous compound corymbs; calyx-tube broadly obconic, the lobes wide, acuminate, glandular-serrate, glabrous on the outer, slightly villose on the inner face, reflexed after anthesis; stamens 10; anthers dark rose color; styles usually 5, surrounded at the base by a broad ring of hoary tomentum. Fruit on stout hairy pedicels, in compact few-fruited drooping clusters, subglobose and flattened at the ends to oblong or rarely to obovate, dark crimson, lustrous, marked by few small pale lenticels, 1.2-1.4 cm. in diameter; calyx-cavity deep, comparatively narrow, the lobes elongated, gradually narrowed from broad bases, acuminate, coarsely glandular, dark red on the upper side below the middle, reflexed and closely appressed, their tips often deciduous from the ripe fruit; flesh thick, sweet, dry and mealy, tinged with red; nutlets 5, broad, rounded at the obtuse ends, conspicuously ridged on the back, with a high rounded ridge, 7 mm. long.

A shrub, or occasionally a tree 4-6 m. in height, with numerous intricately branched stems covered with pale gray bark, tortuous branches, and slender zigzag branchlets, dark red, marked by many pale lenticels and furnished with a few long pale caducous hairs when they first appear, bright red-brown and lustrous at the end of their first season, becoming dark red or gray-brown during their second season, and armed with numerous very slender nearly straight light red-brown shining spines usually about 5 cm. in length, and very persistent. Flowers at the end of May or early in June. Fruit ripens the middle of October and falls the first of November.

Rochester; west side of river above Elmwood avenue and along feeder bank, Wolcott Road, *John Dunbar*, June 6, 1901, October 15, 1902.

This species may in its name be properly associated with Miss Florence Beckwith, one of the authors of *Plants of Monroe County, New York, and Adjacent Territory*, published in the third volume of the *Proceedings of the Rochester Academy of Science*.

Crataegus matura, Sargent, *Rhodora*, iii. 24 (in part) 1901; v. 144.

Rochester; common in rich soil in Monroe and Orleans counties, *J. Dunbar*, May and August, 1901, August, 1902.

Crataegus Dunbari, *n. sp.*

Leaves ovate to oval or suborbicular, acute or acuminate, rounded or rarely cuneate at the entire base, sharply doubly serrate above, with straight or incurved teeth tipped with large dark glands, and slightly divided above the middle into short spreading acute lobes; when they unfold slightly tinged with red and roughened by short white hairs, and more than half-grown when the flowers open and then very thin, dark yellow-green and scabrate on the upper surface, and pale yellow-green on the lower surface; at maturity becoming thick and firm in texture, dark olive-green and smooth or still slightly rough above, light yellow-green below, 5-6 cm. long, 4-6 cm. wide, with slender yellow midribs and 4 or 5 pairs of primary veins deeply impressed on the upper side; petioles stout, wing-margined at the apex, grooved, sparingly glandular, 1.5-2.5 cm. in length. Flowers 1.6 cm. in diameter on long slender slightly hairy pedicels, in compact usually 10 to 14-flowered thin-branched compound corymbs; calyx-tube broadly obconic, glabrous, the lobes separated by wide rounded sinuses, slender, acuminate, coarsely glandular-serrate below the middle, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 10; anthers rose color; styles 3 or 4, surrounded at the base by a broad ring of pale tomentum. Fruit on stout reddish pedicels, in drooping many-fruited clusters, subglobose but often rather broader than long, crimson, lustrous, marked by minute dark dots, from 1.2 to 1.4 cm. in diameter; calyx small, with a very short tube, a narrow shallow cavity, and reflexed closely appressed lobes, gradually narrowed from broad bases, glandular-serrate below, entire above the middle, dark red-brown on the upper side toward the base, their tips often deciduous from the ripe fruit; flesh nearly white, thin, sweet, dry and mealy; nutlets 3 or 4, thin, acute at the ends, obscurely ridged and sometimes slightly grooved on the rounded back, 7 mm. long.

A round-topped shrub from 3-4 m. tall and broad, with numerous stout intricately branched spreading stems and slender nearly straight branchlets, marked by few small pale lenticels, light olive-green during

their first season, becoming bright red-brown and lustrous the following year and ultimately dull gray, and armed with stout curved light red-brown shining spines 3-5 cm. long, usually pointed downward toward the base of the branch, and often long-persistent on the old stems.

Rochester; bluffs of the gorge of the Genesee River north of the city, *C. S. Sargent*, September 19, 1900, September, 1902, *John Dunbar*, October 10, 1900, *John Dunbar*, May and October, 1901, October, 1902; Adams Basin, *M. S. Baxler*, October, 1902; Delaware Park, Buffalo, *John Dunbar*, October 6, 1902.

This species, which is easily recognized by the olive-green color of the branches in their first year, is placed temporarily with the *Tenuifoliae*. The leaves, however, become much thicker late in the season than the leaves of the other species of this group, and in their form approach those of *Crataegus Durobrivensis*, Sargent, and it may be desirable to consider *Crataegus Dunbari*, a type of a new section of the genus, characterized by flowers with 10 stamens and rose-colored anthers, subglobose fruit with a small fruiting calyx, and by thick ovate or semiorbicular leaves. This handsome plant is named for Mr. John Dunbar, the assistant superintendent of the parks of Rochester, untiring in labor in making known the remarkable group of *Crataegus* found in the valley of the Genesee River, who first pointed it out to me.

Crataegus benigna, n. sp.

Glabrous with the exception of the hairs on the upper surface of the young leaves and their petioles. Leaves oblong-ovate, acuminate, abruptly concave-cuneate or rounded at the wide crenate or entire base, sharply doubly serrate above, with straight gland-tipped teeth, and slightly divided into 4 or 5 pairs of short broad acute or acuminate lobes; when they unfold covered on the upper surface with short rigid pale hairs and more than half grown when the flowers open and then very thin, light yellow-green and still slightly hairy or scabrate above; at maturity thin but firm in texture, dull dark bluish green and still slightly roughened on the upper surface, pale bluish green below, 5-6 cm. long, 4.5 cm. wide, with stout orange colored midribs and 4 or 5 pairs of thin primary veins extending obliquely to the points of the lobes; petioles slender, slightly wing-margined at the apex, grooved, sparingly glandular, villose along the upper side early in the season, soon glabrous, 2-3 cm. in length; on vigorous leading shoots

leaves broadly ovate and cordate, or the uppermost sometimes ovate or narrow-ovate, acuminate, concave-cuncate and gradually narrowed to the stout petioles, broadly wing-margined nearly to the base, deeply lobed, very coarsely serrate, 9-10 cm. long and 4.5-5.5 cm. wide, their stipules foliaceous, lunate, acuminate, coarsely glandular-serrate, persistent through the season. Flowers about 1.5 cm. in diameter on slender pedicels, in wide lax many-flowered thin-branched compound corymbs; bracts and bractlets linear, acuminate, mostly deciduous before the flowers open; calyx broadly obconic, the lobes separated by wide rounded sinuses, gradually narrowed from the base into long slender acuminate entire tips, reflexed after anthesis; stamens 20; anthers small, red or deep rose color; styles 3 or 4, surrounded at the base by a narrow ring of pale tomentum. Fruit on slender pedicels, in abundant drooping many-fruited clusters, oblong, full and rounded at the apex, depressed at the insertion of the stalk, dull scarlet, marked by occasional dark dots, 1.2-1.4 cm. long, 8-9 mm. wide; calyx sessile, with a narrow shallow cavity and only slightly enlarged reflexed and appressed lobes dark red on the upper side near the base, their tips often deciduous from the ripe fruit; flesh thick, yellow, rather juicy, of a disagreeable flavor; nutlets 3 or 4, usually 4, thick, full and rounded at the ends, ridged on the back with a high narrow ridge, 7 mm. long.

A shrub from 2 to 4 m. in height, with ascending and spreading stems covered with rough scaly dull gray bark, and slender zigzag branchlets, light red-brown and marked by many small pale lenticels when they first appear, pale brown at the end of their first season, becoming ashy gray or gray tinged with red the following year, and armed with many stout curved or slender nearly straight bright red or purple shining spines, from 4 to 5 cm. in length. Flowers during the first week of June. Fruit ripens at the end of September and does not entirely fall until after the middle of October.

Rochester; not common; both sides of Genesee River south of the city, *C. S. Sargent*, September, 1900 and 1902, *John Dunbar* and *C. C. Lancy*, October 10, 1900, *John Dunbar*, May, June and October, 1901, September and October, 1902.

§ COCCINEAE.

Fruit medium size, subglobose, scarlet or crimson; nutlets 3-5, conspicuously ridged on the back; corymbs many or few-flowered, villose or glabrous; stamens 10-20; anthers rose color or yellow; leaves subcoriaceous or thin, dark green.

Stamens 10.

ANTHERS PINK.

Leaves obovate to rhombic, subcoriaceous, lustrous, scabrate on the upper surface; corymbs many-flowered, slightly villose; fruit globose to short-oblong, scarlet; nutlets 3-4.

33. *C. cupulifera*.

Stamens 20.

ANTHERS YELLOW.

Leaves obovate to rhombic, ovate or oval, thin, dull dark green and scabrate on the upper surface; corymbs few-flowered, glabrous; fruit subglobose to short-oblong, crimson; nutlets 4-5.

34 *C. Macauleyae*.

Crataegus cupulifera, n. sp.

Leaves obovate to rhombic, acuminate gradually narrowed from near the middle to the acute entire base, sharply doubly serrate above, with straight gland-tipped teeth, and lacinate above the middle, with many narrow acuminate lobes, tinged with red, sparingly villose on the upper side and glabrous below when they unfold, and about half grown when the flowers open and then membranaceous, light yellow-green and still slightly villose; at maturity subcoriaceous, dark yellow-green, lustrous and scabrate above, pale yellow-green below, 5-7 cm. long, 4-5 cm. wide, with slender yellow midribs deeply impressed above, and 4 or 5 pairs of thin primary veins arching obliquely to the points of the lobes; petioles slender, wing-margined at the apex by the decurrent base of the leaf-blades, grooved, often slightly glandular, generally rose color in the autumn toward the base, 2-3 cm. in length; stipules linear to narrowly obovate, acuminate, glandular, reddish, usually deciduous before the flowers open; on vigorous leading shoots leaves ovate, concave-cuneate and gradually narrowed below into broadly winged very glandular petioles, deeply lobed, 8-10 cm. long, 6-8 cm. wide, their stipules foliaceous, lunate, coarsely serrate, usually early-deciduous. Flowers cup-shaped, 1.5 in diameter, on long

slender pedicels, in wide many-flowered thin-branched slightly villose corymbs; bracts and bractlets linear, acuminate, glandular on the margins, with minute dark red stipitate glands; calyx-tube broadly obconic, the lobes separated by wide rounded sinuses, broad, acuminate, glandular-serrate, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 10; anthers small, pink or light rose color; styles 3-4, surrounded at the base by a narrow ring of pale tomentum. Fruit on slender pedicels, in wide many-fruited pendulous clusters, globose to short-oblong, scarlet, lustrous, marked by few minute dark dots, about 1 cm. in diameter; calyx very prominent, with a broad shallow cavity, and much enlarged coarsely serrate reflexed villose lobes, dark red on the upper side near the base, often 8 mm. in length, and frequently persistent on the ripe fruit; flesh yellow, thin, dry and mealy; nutlets 3 or 4, thin, obtuse at the ends, ridged with a broad grooved ridge or rounded and only slightly grooved on the back, 7 mm. long.

A shrub occasionally 6 or 7 m. in height with numerous stems often 1.5 dm. in diameter, covered with dark brown scaly bark, spreading into broad dense thickets, small erect or spreading branches forming an irregular open head, and slender zigzag branchlets light orange-green and glabrous when they first appear, bright red-brown, very lustrous and marked by few large scattered pale lenticels at the end of their first season, lustrous and light grayish brown the following year, and armed with numerous slender straight or slightly curved light red-brown or purple shining spines, 3-5 cm. in length; winter-buds conspicuous, globose, covered with bright red lustrous scales, 8 mm. in diameter. Flowers at the end of May or early in June. Fruit ripens the middle of October.

Rochester, *C. S. Sargent*, September 19, 1899, September, 1900, *John Dunbar*, May 28 and October 11, 1900, May, June and October, 1901, October, 1902; Honeoye Lake and Rush, *M. S. Baxter*, May and September, 1902; Buffalo, *John Dunbar*, May, 1902.

***Crataegus Macauleyae*, n. sp.**

Leaves obovate, rhombic, ovate or oval, acute or acuminate or occasionally rounded at the apex, gradually narrowed to the concave-cuneate entire base, finely and doubly serrate above, with straight incurved glandular teeth and slightly and irregularly lobed above the middle; about half grown when the flowers open and then thin, dark yellow-green and scabrate above, pale below, slightly villose along the

midribs on both surfaces and often in the axils of the primary veins below ; at maturity thin but firm in texture, glabrous, dark dull green and slightly roughened on the upper surface, pale on the lower surface, 4-6 cm. long, 3.5-5 cm. wide, with slender yellow midribs and 4 or 5 pairs of very thin primary veins extending obliquely to the points of the lobes ; petioles slender, wing-margined at the apex, grooved, slightly villose, occasionally glandular on the upper side early in the season, soon glabrous, usually tinged with red in the autumn, 1.2-2 cm. in length ; on vigorous leading shoots leaves usually ovate, abruptly long-pointed, rounded or cuneate at the base and often 7-8 cm. long and broad, their petioles stout, broadly winged, with foliaceous lunate acuminate glandular-serrate persistent stipules. Flowers 1.6-1.8 cm. in diameter, on long slender pedicels, in compact few-flowered thin-branched glabrous corymbs ; calyx nearly obconic, glabrous, the lobes wide, elongated, acuminate coarsely glandular-serrate, glabrous on the outer, villose on the inner surface, reflexed after anthesis ; stamens 20 ; anthers small, pale yellow ; styles 4 or 5. Fruit on slender reddish pedicels, in few-fruited drooping clusters, subglobose to short-oblong, dark crimson, lustrous, marked by numerous large pale lenticels, 1-1.2 cm. in diameter ; calyx prominent, with a short tube, a broad deep cavity and coarsely serrate nearly glabrous reflexed and closely appressed lobes ; flesh thin, yellow, dry and mealy ; nutlets 4 or 5, thin, full and rounded at the apex, gradually narrowed to the base, ridged on the back, with a broad grooved or with a narrow rounded ridge, or rounded and only slightly grooved on the back, 6-7 mm. long.

A tree 5-6 m. in height, with a tall trunk 1.5 dm. in diameter, covered with pale olive-green bark, slender somewhat pendulous branches and thin nearly straight branchlets, light red-brown marked by many pale lenticels when they first appear, light red-brown and very lustrous at the end of their first season, becoming dark gray-brown the following year, and armed with few straight slender light red-brown and shining usually dark gray spines, 2.5-3 cm. in length. Flowers at the end of May. Fruit ripens early in October and falls before the middle of November.

Rochester ; Genesee Valley Park, *John Dunbar* and *C. C. Laney*, October 12, 1901, June 3, 1902, October 6, 1902 ; *C. S. Sargent*, September 30, 1902.

This species is named for Miss Mary Elizabeth Macauley, one of the authors of *Plants of Monroe County, New York, and Adjacent Territory*.

§ TOMENTOSAE.

Fruit small or medium size, pyriform, subglobose or short-oblong, orange-red or scarlet; nutlets 2-5, penetrated on each of the inner faces by a longitudinal cavity; corymbs many-flowered, villose or glabrous; calyx-lobes glandular-serrate; stamens 10-20; anthers rose color or yellow; leaves thin or coriaceous, more or less pubescent or rarely glabrous on the lower surface.

ANTHERS ROSE COLOR.

Stamens 20.

Leaves ovate to ovate-oblong, thin, densely pubescent below; fruit pyriform, small, orange-red; nutlets 2-5.

35. *C. tomentosa*.

Leaves elliptical, acute at the ends, puberulous along the under side of the midribs and veins; fruit globose, becoming soft and succulent at maturity; nutlets 2-3.

36. *C. succulenta*.

Leaves broadly oval to obovate, coriaceous, pubescent below; fruit subglobose to short-oblong, becoming soft and succulent at maturity; nutlets 2-3, usually 3.

37. *C. gemmosa*

Stamens 10.

Leaves ovate, thin, glabrous; fruit subglobose to short-oblong; nutlets 2-3, usually 3.

38. *C. Deweyana*.

ANTHERS YELLOW.

Leaves broadly obovate to elliptical or oval, coriaceous, pubescent below along the midribs and veins; fruit small scarlet, erect; nutlets 2-3; spines long and slender.

39. *C. macracantha*.

Leaves rhombic to oval or obovate, coriaceous, puberulous below along the midribs and veins; fruit subglobose to short-oblong; nutlets 2; spines stout.

40. *C. ferentaria*.

Leaves oval to oblong-obovate, thin, puberulous along the midribs and veins below; fruit subglobose, dark orange-red; nutlets 2-4.

41. *C. Laneyi*

Crataegus tomentosa, Linnaeus. Sargent, *Silva*, N. Am. iv. 101, t. 183.

Rochester; Common.

Crataegus succulenta, Link. Sargent, *Silva N. Am.* xiii. 139, t. 131.

Rochester, C. C. Laney, May 31, 1900, C. S. Sargent, September 18, 1900, John Dunbar, June and October 1901; Niagara Falls, C. S. Sargent, September 1900; Rush, N. Y., M. S. Baxter and John Dunbar, June 1902.

Crataegus gemmosa. Sargent, *Bot. Gazette*, xxxiii. 119 (1902); *Silva N. Am.* xiii. 141, t. 686.

Rochester; rare; Genesee Valley Park, John Dunbar and C. C. Laney, June and October, 1901.

Crataegus Deweyana, n. sp.

Leaves ovate, acuminate or abruptly long pointed at the apex, abruptly narrowed and concave-cuneate at the entire often unsymmetrical base, coarsely doubly serrate above, with straight or incurved gland-tipped teeth, and slightly divided often only above the middle into several pairs of small acuminate spreading lobes; about a third grown when the flowers open and then membranaceous, dark yellow-green and covered with short lustrous white hairs on the upper surface and light yellow-green and glabrous on the lower surface; at maturity thin, yellow-green and scabrate above, pale below, 8-10 cm. long, 5-7 cm. wide, with stout orange colored midribs deeply impressed on the upper side, and 6 or 7 pairs of thin primary veins arching obliquely to the points of the lobes; petioles stout, wing-margined at the apex by the decurrent base of the leaf-blades, deeply grooved, sparingly villose along the upper side, soon glabrous, glandular with occasional minute dark glands, usually dull orange color in the autumn, 2-3 cm. in length; on vigorous leading shoots more deeply lobed and more closely serrate than on fertile branchlets, subcoriaceous, often 10 cm. long and 9 cm. wide, gradually narrowed into stout broadly winged coarsely glandular petioles, their stipules foliaceous, stipitate, lunate, sharply lobed, glandular-serrate, with minute dark red glands, sometimes 1.5 cm. long, persistent through the season. Flowers 1-1.2 cm. in diameter, on slender pedicels in wide lax many-flowered thin-branched slightly villose compound corymbs; calyx narrowly obconic, often villose at the base, glabrous above, the lobes slender, elongated, acuminate, finely glandular-serrate usually only above the middle, dark green and glabrous on the outer surface, villose on the inner surface, reflexed after anthesis; stamens 7-10,

usually 10 ; anthers small, dark rose color ; styles 2 or 3, usually 2. Fruit on long slender puberulous pedicels, in wide many-fruited drooping clusters, subglobose to short-oblong, full and rounded at the ends, scarlet, lustrous marked by occasional large pale lenticels, 1 1-2 cm. in diameter ; calyx sessile, with a narrow deep cavity, the lobes elongated, glandular-serrate, dark red on the upper side near the base, usually erect and incurved, mostly persistent on the ripe fruit ; flesh when fully ripe thick, yellow and sweet ; nutlets usually 2, occasionally 3 ; 8-9 mm. long, 6-7 mm. wide, full and rounded at the ends, rounded and conspicuously ridged on the back, with a broad low doubly grooved ridge, the ventral cavities broad and shallow.

A tree 7-8 m. in height with a tall stem sometimes 2.5 dm. in diameter, covered with light gray bark, becoming rough and scaly near the base, slender branches, the lower horizontal and wide spreading, the upper ascending and forming a wide open irregular head, and stout zigzag branchlets dark orange-brown and marked by many large oblong pale lenticels when they first appear, deep red-brown and lustrous on the upper, gray-brown and lustrous on the lower side during their first winter, becoming gray slightly tinged with red the following year, and armed with numerous stout curved chestnut-brown or purple spines 4-5 cm. long, occasionally persistent on old stems. Flowers during the last week of May. Fruit ripens from the first to the middle of October and falls about the end of the month.

Rochester ; Hagaman Swamp, *John Dunbar*, October 12, 1901, September 1902, *C. S. Sargent*, September 30, 1902 ; Rush, New York, near Five Points, *M. S. Baxter*, June, 1902.

This handsome tree is named in memory of Chester Dewey, a native of Sheffield, Massachusetts, and for more than thirty years a citizen of Rochester where he was Principal of the Rochester Collegiate Institute and subsequently professor of chemistry and natural philosophy in the University of Rochester. By botanists he will be remembered by his studies of the genus *Carex*, commenced in 1824, by his *History of the Herbaceous Plants of Massachusetts*, prepared under the auspices of that state, and by his *Catalogue of Plants and Time of Flowering in and about the City of Rochester for the year 1841*, published by the Regents of the University of the State of New York.

ANTHERS YELLOW.

Stamens 10.

Crataegus macracantha, Koehne. Sargent, *Silva N. Am.* xiii. 147, t. 689.

Sparingly on both sides of the Genesee River north and south of Rochester, N. Y.

Crataegus ferentaria, *n. sp.*

Leaves rhombic to oval or obovate, acute, short-pointed or rounded at the apex, gradually narrowed to the entire often unsymmetrical base, sharply doubly serrate above, with straight gland-tipped teeth, and slightly divided above the middle into numerous small acute lobes; more than half grown when the flowers open and then very thin, dark yellow-green and slightly villose on the upper surface particularly on the midribs, and lighter colored and pubescent below along the midribs and principal veins; at maturity coriaceous, dark yellow-green, very lustrous and smooth above, pale and still puberulous below on the stout midribs, deeply impressed on the upper side and often rose color on the lower side late in the autumn and on the 6 or 7 pairs of slender primary veins extending obliquely to the points of the lobes, 5.5-9 cm. long, 4-6 cm. wide; petioles stout, wing-margined at the apex by the decurrent bases of the leaf-blades, deeply grooved, slightly villose early in the season, soon glabrous, occasionally glandular, often rose color in the autumn, 1-2 cm. in length; on vigorous leading shoots leaves usually oval, full and rounded or sometimes concave-cuneate at the base, mostly abruptly short-pointed at the apex, often 10 cm. long and 7-8 cm. wide. Flowers 1.5 dm. in diameter on slender pedicels, in wide many-flowered thin-branched villose compound corymbs; bracts and bractlets narrow-obovate to linear, acuminate, glandular mostly deciduous before the flowers open; calyx broadly obconic, glabrous, the lobes wide, acute, glandular-serrate, with large bright red glands, glabrous on the outer, villose on the inner surface, spreading after anthesis; stamens 10; anthers pale yellow; styles 2. Fruit on elongated slender reddish pedicels, in broad lax drooping clusters, subglobose to short-oblong, crimson, very lustrous, about 1-2 cm. in diameter, marked by occasional large pale dots; calyx prominent, with a broad shallow cavity and much enlarged coarsely glandular-serrate lobes, villose above, dark red toward the base on the upper side, somewhat erect or spreading, usually persistent on the ripe fruit; flesh, thick, yellow, sweet and succulent; nutlets 2, rounded at the obtuse ends, 6 mm. long and wide, ridged on the back, with a broad

usually grooved ridge, remarkably thin-walled, the ventral cavities deep and narrow.

An intricately branched shrub 3-4 m. tall, with erect and spreading stout stems covered sometimes to the height of 2 m. with very rough dark ashy gray bark, and stout zigzag branchlets, dark orange-green and marked by many large pale lenticels when they first appear, light red-brown and very lustrous at the end of their first season, becoming dark gray-brown the following year, and slightly armed with stout nearly straight bright red-brown or purple lustrous shining spines, long persistent and ultimately ashy gray, 3.5-5.5 cm. long. Flowers during the first week of June. Fruit ripens at the end of September and soon falls. The leaves turn yellow and fall very early in the autumn.

Rochester; common on both sides of river south of the city, *John Dunbar*, May, September and October, 1901; Conesus Lake, *M. S. Baxter*, September, 1902.

Crataegus Laneyi, Sargent, *Trees and Shrubs*, i. 5, t. 3 (1902).

Rochester; low moist banks of the Genesee River in Genesee Valley Park, *C. C. Laney*, June, 1899, *John Dunbar*, June and October, 1901, *C. S. Sargent*, September, 1901.

C. oxyacantha, Linnaeus and **C. monogyna**, Jacquin, cultivated species from Europe are sparingly naturalized throughout Monroe County, N. Y.

There are, besides the above list of *Crataegus* growing without cultivation, about sixty species planted in the parks and park nurseries at Rochester.

Arnold Arboretum,
Jamaica Plain, Mass.

