

CRATAEGUS IN OHIO WITH DESCRIPTION OF ONE NEW SPECIES

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This review of *Crataegus* in Ohio has been made in cooperation with the Ohio Flora Committee of the Ohio Academy of Science as a contribution to their forthcoming flora of the state. Many of the universities and colleges of the state have sent collections of herbarium specimens to me for examination, and information has been drawn from these and other sources including some private collections. The large collection in the herbarium of the Ohio State University, covering most of the state, has been particularly helpful. Other institutions sending large collections were the University of Cincinnati, Oberlin College, Miami University, and Defiance College. Dr. E. Lucy Braun also sent many interesting collections from her private herbarium; and she has given invaluable assistance in outlining the work and in cooperating with it in many ways. In addition to the larger collections mentioned above, specimens have been received from Ohio University, Dennison University, Kent State University, Antioch College, and from the private collection of Mr. John Guccion of Cleveland. Dr. Gerald B. Ownbey also sent a number of collections from Ohio deposited in the herbarium of the University of Minnesota. The large amount of material from Ohio in the herbarium of the Arnold Arboretum, Jamaica Plain, Massachusetts, was also checked, including duplicates of many of the collections seen in Ohio herbaria, and also fuller collections made by R. E. Horsey in many parts of the state, and by F. J. Tyler, Harry Crowfoot, and C. C. Clevenger, mostly in Lake and adjoining counties. Many other scattered specimens have also been received and checked.

But after examining all of these records it is obvious that much remains to be done before a complete list of the *Crataegus* flora of the state can be made, or anything like full data on the distribution of the species in the state can be given. It is possible that some species of *Crataegus* are indigenous in every county; several of the commoner species, such as *Crataegus crus-galli* and *C. punctata* have a state-wide distribution and might be expected in nearly if not all of the counties. *C. mollis*, generally on calcareous soil, is almost limited to western Ohio where calcareous soils prevail; there, it is in almost every county. At present there are a number of counties from which we have no records. This is no doubt due to the fact that botanical interest and collecting is always sporadic and unevenly distributed. Full and systematic collecting is usually limited to the vicinities of the larger educational institutions or of the homes of amateur botanists. What is done in other sections is occasional and scattered.

Crataegus is the largest genus of woody plants found in Ohio; and this also holds true for the entire United States. Nearly all of the species are small trees or arborescent shrubs found growing in thickets or on the borders of woods, and they have often become established in pastures and along fencerows. Their dispersion is probably largely due to birds that feed upon the fruit and deposit the undigested seeds in their droppings. Since most of the species cannot stand the competition of larger trees, the genus is rare or absent in densely forested areas; there are fewer records from wooded eastern Ohio than from agricultural western Ohio. It is certain that there has been a very great increase in individuals and in the areas available to them since much of the country has been cleared and brought into cultivation. The changed conditions and increased

competition between the original species have probably resulted in the development of many new forms and hybrids.

While most species of *Crataegus* are not absolutely selective as to soil, they show a decided preference for alkaline soils, and they are most abundant and varied in limestone regions; this is well illustrated by the range of *C. mollis*. The *Crataegus* flora of Ohio is a large and diverse one due to the wide range of ecological conditions found in the state and to the fact that large areas are underlaid with

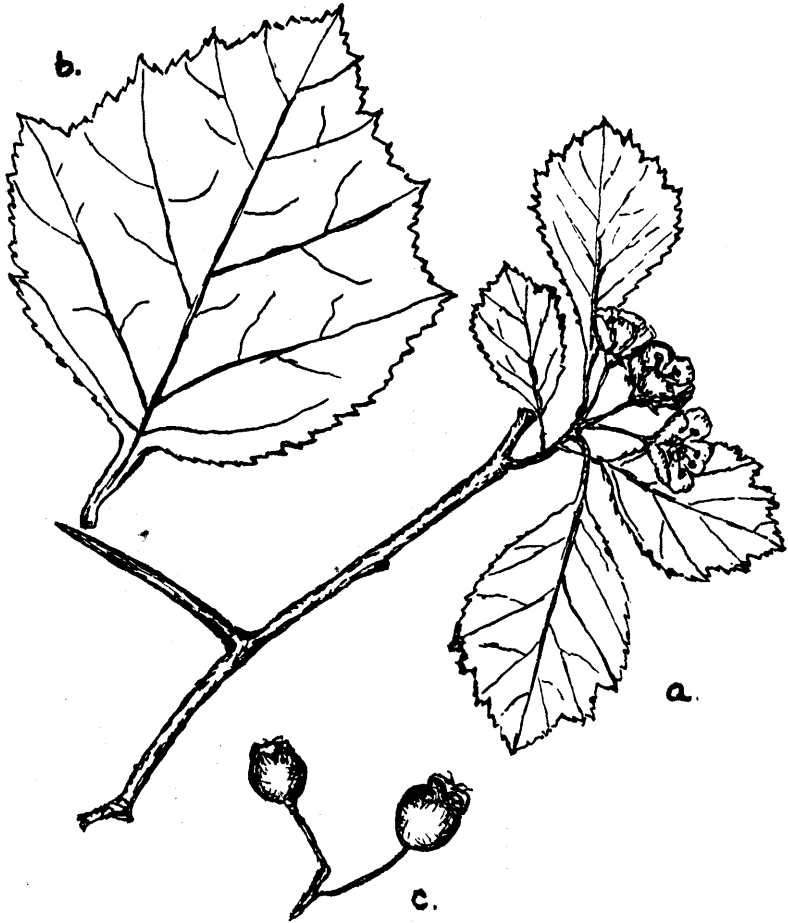


FIGURE 1

Crataegus Horseyi n. sp. a. Flowers and leaves of flowering branchlet. b. Leaf of vigorous terminal shoot, maximum size. c. Fruits. All figures natural size.

limestone or are covered with alkaline or neutral soils. The list contains 67 species, including 4 that are represented only by a variety other than the typical one, 30 additional varieties, 2 forms, and 4 unnamed hybrids. It is not unlikely that a few more might be added by further exploration. Three species, *Crataegus oxyacantha*, *C. monogyna*, and *C. prunifolia*, have been introduced, and are now

common in cultivation in both European and American gardens. The first two, commonly known as English Hawthorn, are natives of the Old World, and occur more or less frequently as escapes from cultivation. *C. prunifolia*, rarely occurring as an escape, was described from a tree found growing in a European garden, and appears to be a hybrid between two North American species, *C. crus-galli* and *C. Calpodendron* or a related species.

The hawthorns or red haws are amongst our most ornamental trees. Their profusion of fragrant blossoms, often opening before or with the leaves, their widely variable but often thick and glossy foliage, and the abundant usually bright-colored fruit, combine to make them attractive throughout the year. Another advantage that recommends them for planting is the abundant supply of bird food they supply. For the haws are eaten by birds not only at the time of ripening, but also later; the fruit of some species stays on the trees until late in the season, and often it remains on the ground through the winter, thus affording food for birds and small mammals when most other sources have been exhausted. For these reasons, a number of native species are now often planted in parks and private grounds, and particularly along parked roadways. American hawthorns were also early introduced into English and other European gardens, and they have long been more appreciated abroad than in their native country. The English hawthorn is also popular in cultivation here; in some forms the flowers are double, or are pink or red in color. It is famous in literature and folklore, and is closely associated with the Mayday festival and other holidays. It is commonly used for hedges in parts of rural England; some American species could be used to advantage where a dense ornamental hedge is desired.

The classification of *Crataegus* is one of the most puzzling and difficult in American botany. Botanists have disagreed widely as to how many species should be recognized and as to the value of the characters that have been used to distinguish them. Some species are well-marked and as easily recognized as species in other large genera. But in certain sections there is so much variability and merging of characters that it is most difficult to distinguish them, and it becomes a matter of opinion where the lines should be drawn between species. More than 1500 names have been proposed for American *Crataegi*, and most of these have been called species. But most students have come to believe that many of them can more properly be regarded as forms of variable species, that many are of hybrid origin, and others are transient sports or clones that could only be propagated vegetatively, and that can scarcely be called species as the term is generally understood. A considerable proportion of the proposed species are extremely local, and in some cases were known only from a single plant. The whole subject is a very complicated one and one in which there is much room for differences of opinion. Much more study and experimental work is needed to determine the validity and relationship of many species and forms. Any classification that has so far appeared can only be regarded as a tentative and provisional one.

The characters that have usually been used to distinguish species and other segregates in *Crataegus* are the shape, size, texture, and other variations in the leaves; the size and number of the flowers and their arrangement and structural parts, such as petals, sepals, stamens, anthers, and styles; the size, shape, color, and texture of the fruit; number and form of the nutlets; and size and form of the calyx. Of lesser importance but often described are the habit of growth, and characters of branches, bark, and thorns. All of these characters are variable and are combined with each other in various ways. In some cases, characters differ within the species, while in others some of them are sufficiently constant to differentiate the species. Much stress has been laid, especially by Sargent, on the number of stamens and the color of the anthers. But while they seem fairly

constant in some species they are not so in others; except where they are supplemented by other distinctions they cannot be relied on as specific distinctions. So until fuller information is available as to the origin and genetic relationships of the many intermediate forms, a conservative treatment seems most practicable and advisable.

CRATAEGUS L.

The name is from a Greek word signifying strength or invincibility; and it probably referred to the dense and thorny nature of the plants that made them immune from attack rather than to the strength of the wood, as has often been suggested. The plants are shrubs or small trees usually with crooked thorny branches. The leaves are alternate and vary greatly in shape and size in different species, and to some extent within the species. Terminal leaves of sterile shoots or of new and vigorous growth are often unlike those of the flowering branchlets. Such leaf specimens should never be collected for determination except in connection with flowering or fruiting material. The flowers are regular, normally with five petals and five to twenty stamens, and one to five styles. In most species they are several in number, borne in simple or branching corymbs or cymes, or rarely they grow singly or two or three in a close cluster. The fruit is a pome or haw with one to five bony nutlets embedded in the firm to succulent flesh. The fruits vary in shape from subglobose to oblong-cylindric, ovoid, or obovoid; they are sometimes slightly 5-angled. In our species, the color when ripe is some shade of red or more rarely yellow; but some species remain green and hard throughout the season. The fruit of some species is edible with a pleasing and distinctive flavor. While little use is made of it in this region, it has economic possibilities through selection and cultivation. One disadvantage is that it is commonly infested with the larva of a weevil; but this might be corrected by spraying.

For convenience, the genus has been divided into a number of groups or series that differ from each other in the degree of their distinctness of characters. Fourteen series are recognized as occurring in Ohio. A key to these, together with a list of the species, varieties, and forms under the different series is given below with essential synonymy and a list of the counties in which each has so far been found. Keys, descriptions of the series, and notes concerning the species will be published in the proposed Flora of Ohio. Several new combinations and the description of one new species are published here. Incomplete or inconclusive material examined indicates a few other unrecognized forms, species or hybrids.

KEY TO THE SERIES

- a. Veins of the leaves running to the sinuses as well as to the points of the lobes; leaves mostly ovate or deltoid in outline, distinctly lobed; fruit subglobose, 4-10 mm. thick.
 - b. Leaves often trilobate, up to 5-6 cm. long, thin, turning red or yellow in autumn, early deciduous; flowers in many-flowered compound corymbs, opening in late May or early June; fruit 4-6 mm. thick, bright red, becoming succulent, remaining on branches until late winter; nutlets 3-5. 1. *CORDATAE*
 - bb. Leaves usually deltoid or broadly ovate in outline with 5-7 lobes, firm in texture, remaining green and persistent until late in season; flowers opening usually before middle of May; fruit firm or mellow at maturity, falling early; nutlets 1-2 or rarely 3. 2. *OXYACANTHÆ*
- aa. Veins of the leaves running only to the points of lobes or larger teeth; leaves entire or variously lobed; fruit subglobose, oval, ovoid, or pyriform, 0.5-1.5 cm. thick.
 - b. Flowers single or rarely 2-3 in cluster; stamens 20-25; sepals foliaceous, pectinate; slender shrubs usually less than 1.5 m. tall. 3. *PARVIFOLIAE*
 - bb. Flowers more numerous, in simple or compound corymbs or cymes; stamens 5-20; sepals entire or glandular-serrate, not foliaceous; trees or stout arborescent shrubs.
 - c. Leaves of various shapes, cuneate to subcordate at base, glabrous or pubescent; fruit 0.5-1.5 cm. thick; nutlets 1-5, not pitted on ventral surface.
 - d. Leaves mostly spatulate or obovate, broadest above middle except rarely on terminal shoots; unlobed or sometimes more or less lobed on terminal shoots.

- e. Leaves firm to subcoriaceous, often glossy above, the veins inconspicuous or rarely slightly impressed above; flowers 1-1.5 cm. wide; fruit usually 1-1.3 cm. thick or less, with 1-2 or rarely 3-5 nutlets, remaining hard and inedible, usually dull red or green at maturity. 4. CRUS-GALLI
- ee. Leaves firm but not subcoriaceous, dull above, the veins noticeably or conspicuously impressed above; flowers usually 1.3-2 cm. wide; fruit usually becoming mellow and somewhat edible; nutlets 3-5. 5. PUNCTATAE
- dd. Leaves mostly rhombic, ovate, oblong-ovate, or deltoid in outline, broadest below or about middle, usually more or less lobed at ends of shoots.
- e. Foliage and inflorescence glandular, often conspicuously so; leaves usually narrowed at base, except sometimes at ends of shoots; flowers mostly 3-8 in simple or little-branched corymbs; fruit usually remaining hard, green, bronze-yellow or dull red at maturity; branching shrubs, 1.5-3 m. tall. 6. INTRICATAE
- ee. Foliage and inflorescence eglandular or sometimes sparsely glandular when young; flowers usually 8-15 or more in simple or compound corymbs.
- f. Leaves mostly ovate, oblong-ovate, or elliptic in outline, abruptly narrowed or rounded at base, or sometimes deltoid or suborbicular at ends of shoots; fruit usually bright or dull red at maturity, firm to succulent; nutlets usually 3-5.
- g. Leaves of flowering branchlets mostly oblong-ovate or rhombic, sometimes broadly ovate to suborbicular and rounded at base at ends of shoots, more or less incised with shallow or rounded lobes; flowers 1.2-1.5 cm. wide; nutlets 3-5. 7. ROTUNDFOLIAE
- gg. Leaves of flowering branchlets mostly ovate, rounded at base, those at ends of shoots similar but larger, slightly lobed below middle; flowers 1.5-1.8 cm. wide; nutlets usually slightly pitted on ventral surface, or sometimes plain. 8. BRAINERDIANAE
- ff. Leaves mostly ovate, oblong-ovate, or deltoid in outline, rounded to truncate at base, or at ends of shoots broadly ovate to deltoid and often truncate to subcordate at base, more or less lobed; fruit 0.8-1.7 cm. thick; nutlets 3-5.
- g. Leaves mostly ovate, more or less incised with acute lobes terminating in acuminate, often reflexed points, thin at maturity, glabrous except for short appressed hairs on upper surface while young; flowers 1.3-1.8 cm. wide; pedicels glabrous (except in *C. lucorum*); anthers pink; fruit 0.8-1.5 cm. thick, usually becoming mellow or succulent; nutlets 3-5. 9. TENUIFOLIAE
- gg. Leaves mostly ovate or oblong-ovate, firm to thick at maturity, more or less incised, the points of lobes not reflexed; flowers 1.3-2.5 cm. wide; stamens 8-20; fruit 0.8-1.7 cm. thick; nutlets 3-5.
- h. Petioles and midribs of leaves slender; flowers 1.3-2 cm. wide; filaments as long or nearly as long as petals; fruit 0.8-1.8 cm. thick, glabrous; nutlets 3-5.
- i. Leaves glabrous or short-pilose above when young, glabrous beneath (except in *C. locuples*); fruit usually firm or hard at maturity, inedible; nutlets relatively large.
- j. Leaves with short appressed hairs above while young, becoming glabrous; stamens 10 or less; fruiting calyx small and sessile. 10. SILVICOLAE
- jj. Leaves glabrous or essentially so from the first (except in *C. locuples*); fruit often pruinose, sometimes slightly 5-angled, with prominent elevated calyx. 11. PRUINOSAE
- ii. Leaves glabrous or pubescent; stamens 10-20; fruit usually becoming mellow and edible; nutlets relatively small. 12. COCCINEAE
- hh. Petioles and midribs of leaves thick and prominent; filaments shorter than petals; fruit pubescent at least while young, 1.3-1.5 cm. thick, usually becoming mellow and edible; nutlets 3-5, usually 5. 13. MOLLES
- cc. Leaves mostly ovate, oblong-ovate, or elliptic, abruptly narrowed or rounded at base, more or less lobed, glabrous except for short appressed hairs on upper surface while young; flowers mostly 4-14 in simple or little-branched corymbs; fruit hard or firm at maturity; nutlets 2-3 (or rarely more), deeply pitted on ventral surface. 14. MACRACANTHAE

SERIES I. CORDATAE

1. *Crataegus Phaenopyrum* (L.f.) Medic. (*C. cordata* Ait.)
Belmont, Butler, Clinton, Guernsey, Hamilton, Jefferson, Montgomery, Preble.

SERIES II. OXYACANTHAE

2. *Crataegus Oxyacantha* L.
Franklin, Lorain, Vinton, Williams. Native of Eurasia and the Mediterranean region.
3. *Crataegus monogyna* Jacq.
Ashtabula, Cuyahoga, Geauga, Hamilton, Lake, Lorain, Medina. Native of Europe, north Africa, and western Asia.

SERIES III. PARVIFOLIAE

4. *Crataegus uniflora* Muenchh. (*C. trianthoflora* Sarg.)
Adams, Meigs.

SERIES IV. CRUS-GALLI

5. *Crataegus crus-galli* L.
 - a. var. *crus-galli* (*C. algens* Beadle, *C. arduennae* Sarg., *C. attenuata* Ashe, *C. eburnea* Ashe, *C. mollipes* Ashe, *C. trahax* Ashe)
Adams, Athens, Auglaize, Brown, Butler, Clark, Clermont, Clinton, Coshocton, Cuyahoga, Defiance, Fairfield, Franklin, Gallia, Greene, Guernsey, Hamilton, Hardin, Highland, Jackson, Lake, Licking, Lorain, Mahoning, Meigs, Muskingum, Noble, Ottawa, Paulding, Richland, Scioto, Shelby, Stark, Summit, Union, Warren, Washington, Williams, Wood.
 - b. var. *barrettiana* (Sarg.) Palmer (*C. barrettiana* Sarg.)
Clinton, Erie, Franklin, Hamilton, Lawrence, Ottawa.
 - c. var. *exigua* (Sarg.) Egglest. (*C. exigua* Sarg.)
Ashland, Clark, Geauga, Hamilton, Harrison, Lucas, Tuscarawas.
 - d. var. *leiophylla* (Sarg.) Palmer (*C. leiophylla* Sarg.)
Franklin, Lake, Richland.
 - e. var. *pachyphylla* (Sarg.) Palmer (*C. pachyphylla* Sarg.)
Hamilton, Ottawa.
 - f. var. *pyracanthifolia* Ait.
Hamilton, Muskingum.
6. *Crataegus Engelmanni* Sarg.
Richland.
7. *Crataegus Fontanesiana* (Spach) Steud. (*C. geneseensis* Sarg., *C. tenax* Ashe, *C. Wilkinsoni* Ashe)
Auglaize, Butler, Crawford, Cuyahoga, Defiance, Lake, Ottawa, Perry, Richland, Scioto, Shelby, Tuscarawas, Wayne.
8. *Crataegus hannibalensis* Palmer
Defiance.
9. *Crataegus persimilis* Sarg.
Hamilton, Franklin.
10. *Crataegus ohioensis* Sarg.
Franklin.
11. *Crataegus pyracanthoides* Beadle, var. *arborea* (Beadle) Palmer (*C. arborea* Beadle)
Carroll, Lucas, Morgan, Ottawa.
12. *Crataegus vallicola* Sarg.
Clark.

SERIES V. PUNCTATAE

13. *Crataegus punctata* Jacq.
 a. var. *punctata*
 Ashland, Ashtabula, Auglaize, Belmont, Brown Butler, Carroll, Clark, Clermont, Clinton, Columbiana, Coshocton, Cuyahoga, Defiance, Delaware, Fairfield, Fayette, Franklin, Fulton, Guernsey, Hamilton, Hancock, Hardin, Henry, Highland, Hocking, Holmes, Huron, Jefferson, Knox, Lake, Licking, Logan, Lorain, Lucas, Mahoning, Meigs, Monroe, Montgomery, Morrow, Muskingum, Noble, Ottawa, Portage, Preble, Richland, Ross, Seneca, Stark, Summit, Trumbull, Tuscarawas, Warren, Washington, Wayne, Williams, Wood, Wyandot.
- b. var. *aurea* Ait. (*C. crocata* Ashe)
 Clinton, Delaware, Fulton, Hamilton, Hardin, Lake, Mahoning, Ottawa, Paulding, Preble, Richland.
- c. var. *canescens* Britt.
 Crawford, Hancock, Hardin, Lorain, Medina.
- d. var. *microphylla* Sarg.
 Geauga, Lake, Wood.
- e. var. *pausiaca* (Ashe) Palmer (*C. pausiaca* Ashe, *C. calvescens* Sarg., *C. porrecta* Ashe)
 Fayette, Harrison, Jefferson, Lake, Licking, Miami.
14. *Crataegus disperma* Ashe (*C. cuneiformis* of Egglest., in part, *C. praestans* Sarg.)
 Ashland, Ashtabula, Auglaize, Butler, Clermont, Defiance, Erie, Fayette, Franklin, Hamilton, Lake, Licking, Madison, Portage, Richland, Shelby, Tuscarawas, Washington, Wyandot.
15. *Crataegus Kellermanii* Sarg.
 Fairfield, Franklin, Lake, Tuscarawas.
16. *Crataegus mansfieldensis* Sarg.
 Franklin, Richland.
17. *Crataegus indicens* Ashe
 Richland.
18. *Crataegus peoriensis* Sarg. (*C. grandis* Ashe, *C. pratensis* Sarg., *C. cuneiformis* of Egglest., in part)
 Franklin, Hamilton, Lawrence, Monroe, Ross.
19. *Crataegus suborbiculata* Sarg. (*C. Clintoniana* Sarg., *C. Browniella* Sarg.)
 Ottawa.

SERIES VI. INTRICATAE

20. *Crataegus intricata* Lange
 a. var. *intricata* (*C. diversifolia* Sarg., *C. inducta* Ashe, *C. meticulousa* Sarg.)
 Adams, Fairfield, Franklin, Hocking, Knox, Meigs, Ottawa, Summit, Warren.
- b. var. *straminea* (Beadle) Palmer (*C. straminea* Beadle)
 Gallia.
21. *Crataegus Boyntoni* Beadle
 Adams, Guernsey, Lawrence, Morgan, Noble.
22. *Crataegus rubella* Beadle
 Athens, Hardin, Jackson, Summit.
23. *Crataegus fortunata* Sarg.
 Adams, Pickaway.
24. *Crataegus Horseyi* Palmer, sp. nov.
 Type locality, Gallia County.

***Crataegus Horseyi* sp. nov.** Frutex circa 2-4 m. altus ramis sinuosis ascendentibus; ramulis gracilis fusco-rubris spiniferis. Spinae gracilae rectae aut leviter curvae fusco-purpureae 2-5 cm. longae, in ramulis infirmis ramosis. Cortex confertus fusco-canus. Folia glabra aliquantum tenues plerumque elliptica

aut oblongo-ovata apice acuta basi obtuso-cuneata ad attenuata, margine acuto-serratis superne obscuro-lobatis circiter 2-4 cm. longis 2-3.3 cm. latis. Folia circulorum ovata basi rotunda perspicue lobata firma 5-6 cm. longa 4-6 cm. lata. Petioli gracili glandulosi superne alati 1-2 cm. longi. Flores 1-1.3 cm. lati plerumque 3-5 in corymbis glabrescentis simplicibus; pedicellis .9-1.2 cm. longis; staminibus 5-10 saepe 5; antheris rubicundus; stylis plerumque 3; sepalis lanceolatis margine fere integris aut incomposite glandulo-serratis; bractis linearis stipitoglandulosis. Fructus subglobosi 6-9 mm. lati fusco-viridi vel tandem rubicunduli firmi calyce prominente efferto tubo brevi; semenibus plerumque 3.

A shrub 2-4 m. tall usually with several crooked ascending stems and slender thorny branchlets. Thorns sometimes compound on the older stems, slender, straight or slightly curved on branchlets, 2-5 cm. long. Bark close, dark gray. Leaves glabrous, those of the flowering branchlets mostly elliptic or oblong-ovate, pointed or short acuminate at apex, cuneate or attenuate at base, sharply serrate with fine gland-tipped teeth reduced to glands near base of blades, slightly or obscurely lobed above the middle. Petioles slender, $\frac{1}{4}$ to $\frac{1}{3}$ as long as the blades, glandular, slightly wing-margined above. Flowers 1-1.3 cm. broad in simple mostly 3-5 flowered glabrous corymbs; pedicels .9-1.2 cm. long; stamens 5-10, often 5; anthers pink; styles usually 3; sepals lanceolate from a broad base, the margins nearly entire or irregularly glandular-serrate. Bracts conspicuous at flowering time, linear, thickly set with stalked glands on the margins. Fruit subglobose, 6-9 mm. thick, dull green or becoming slightly red late in the season, with a prominent slightly elevated calyx, thin dry flesh and usually 3 nutlets.

Thickets and dry rocky ground. Southern Ohio and southeastern Kentucky. Ohio: Gallipolis, Gallia County. R. E. Horsey, No. 2247, May 13, 1925 (type); September 20, 1925, May 19, 1926; No. 2251, same locality, May 13, 1925, September 20, 1925, May 19, 1926. Kentucky: Middlesboro, Bell County, R. E. Horsey, No. 1973, May 27, 1924, Oct. 2, 1924, May 26, 1926; No. 1975, same locality, May 27, 1924, October 2, 1924, May 26, 1926. All specimens in the Herbarium of the Arnold Arboretum, Jamaica Plain, Massachusetts.

Crataegus Horseyi, of the Intricatae series, is perhaps most nearly related to *Crataegus rubella* Beadle. But it differs from that species in its slightly smaller leaves with more slender petioles, its more compact inflorescence of smaller flowers with usually 5 stamens, and in the globose fruit which is dull green or only slightly reddened, instead of being bright red or orange, and with regularly 3 nutlets. It should be looked for at intermediate or other stations in the region where it has been found. Thanks are due to my daughter, Grace Palmer, for the figure that accompanies the description.

25. *Crataegus biltmoreana* Beadle (*C. polybracteata* Ashe, *C. modesta* Sarg., *C. intricata* of Egglest., not Lange)
Fairfield, Greene, Tuscarawas.

SERIES VII. ROTUNDIFOLIAE

26. *Crataegus* Margaretta Ashe
a. var. Margaretta
Adams, Auglaize, Brown, Butler, Champaign, Clark, Defiance, Franklin, Gallia, Hamilton, Hardin, Highland, Jackson, Lucas, Meigs, Montgomery, Preble, Union, Washington, Williams.
forma xanthocarpa Sarg.
Defiance.
b. var. Brownei (Britt.) Sarg. (*C. Brownei* Britt.)
Franklin, Union, Washington, Williams.
c. var. meiophylla (Sarg.) Palmer (*C. meiophylla* Sarg.)
Adams, Butler, Defiance, Hardin.

27. *Crataegus sicca* Sarg. var. **glabrifolia** (Sarg.) Palmer, stat. nov. (*C. glabrifolia* Sarg.)
Cuyahoga, Defiance, Lawrence.

SERIES VIII. BRAINERDIANAE

28. *Crataegus Brainerdi* Sarg.
a. var. *Brainerdi*
Lucas, Richland.
b. var. *scabrida* (Sarg.) Egglest. (*C. scabrida* Sarg.)
Richland.
29. *Crataegus Coleae* Sarg. (*C. incerta* Sarg.)
Auglaize, Mahoning.

SERIES IX. TENUIFOLIAE

30. *Crataegus macrosperma* Ashe
a. var. *macrosperma* (*C. bella* Sarg., *C. colorata* Sarg., *C. cyanophylla* Sarg., *C. ignea* Sarg., *C. mineata* Ashe, *C. otiosa* Ashe, *C. prona* Ashe, *C. rubicunda* Sarg., *C. suavis* Sarg., *C. tenera* Ashe)
Ashland, Ashtabula, Auglaize, Carroll, Clinton, Columbiana, Cuyahoga, Defiance, Erie, Fairfield, Franklin, Gallia, Geauga, Lake, Lawrence, Licking, Logan, Lorain, Lucas, Medina, Muskingum, Portage, Putnam, Richland, Stark, Summit, Union, Vinton, Warren, Williams.
b. var. *acutiloba* (Sarg.) Egglest. (*C. acutiloba* Sarg.)
Franklin, Jefferson, Williams.
c. var. *demissa* (Sarg.) Egglest. (*C. demissa* Sarg., *C. sextilis* Sarg.)
Logan, Lorain, Trumbull.
d. var. *matura* (Sarg.) Egglest. (*C. matura* Sarg., *C. acuminata* Sarg.)
Franklin, Ottawa.
e. var. *pentandra* (Sarg.) Egglest. (*C. pentandra* Sarg., *C. exigua* Ashe)
Lorain, Richland, Trumbull, Vinton.
f. var. *roanensis* (Ashe) Palmer (*C. roanensis* Ashe)
Adams, Clinton, Fairfield, Highland, Lake, Licking, Lorain, Lucas, Muskingum, Ottawa, Richland, Scioto, Vinton.
31. *Crataegus basilica* Beadle (*C. laetrica* Sarg.)
Richland.
32. *Crataegus lucorum* Sarg. (*C. decens* Ashe)
Franklin, Richland, Vinton.

SERIES X. SILVICOLAE

33. *Crataegus iracunda* Beadle, var. *silvicola* (Beadle) Palmer (*C. silvicola* Beadle, *C. drymophila* Sarg.)
Washington.
34. *Crataegus beata* Sarg. (*C. opulens* Sarg.)
Holmes, Jackson, Lucas, Morrow, Union.
35. *Crataegus brumalis* Sarg.
Ashtabula, Geauga, Lake, Tuscarawas.
36. *Crataegus gravis* Ashe (*C. remota* Sarg.)
Ashtabula, Franklin, Hardin, Jefferson, Lake, Mahoning, Ottawa, Trumbull.
37. *Crataegus populnea* Ashe (*C. blairensis* Sarg., *C. marcida* Ashe, *C. propinqua* Ashe)
Ashtabula, Erie, Franklin, Lake, Lorain, Richland, Trumbull, Tuscarawas.
38. *Crataegus stolonifera* Sarg.
Lorain, Portage.

SERIES XI. PRUINOSAE

39. *Crataegus pruinosa* (Wendl.) K. Koch
 a. var. *pruinosa* (*C. amoena* Sarg., *C. ater* Ashe, *C. horridula* Sarg., *C. Howeana* Sarg., *C. siliens* Ashe)
 Ashtabula, Athens, Brown, Butler, Clermont, Erie, Franklin, Gallia, Guernsey, Hamilton, Harrison, Highland, Hocking, Jackson, Jefferson, Lake, Lawrence, Logan, Lorain, Mahoning, Morgan, Muskingum, Ottawa, Pickaway, Preble, Putnam, Richland, Sandusky, Seneca, Trumbull, Tuscarawas, Vinton, Washington, Wood.
 forma *angulata* (Sarg.) Palmer (*C. angulata* Sarg., *C. placiva* Sarg.)
 Jackson, Washington.
 b. var. *dissona* (Sarg.) Egglest. (*C. dissona* Sarg., *C. marriettensis* Sarg., *C. relicta* Sarg.)
 Butler, Defiance, Hardin, Lake, Lawrence, Lorain, Richland, Scioto, Tuscarawas, Washington.
 c. var. *brachypoda* (Sarg.) Palmer (*C. brachypoda* Sarg.) Clermont, Meigs.
 d. var. *latisepala* (Ashe) Egglest. (*C. latisepala* Ashe, *C. cognata* Sarg., *C. conjuncta* Sarg., *C. jejuna* Sarg.)
 Franklin, Gallia, Jefferson, Lake, Mahoning, Meigs, Ottawa, Perry, Richland, Vinton, Washington.
40. *Crataegus compacta* Sarg. (*C. ellipticifolia* Sarg., *C. repentina* Sarg.)
 Brown, Delaware, Franklin, Jackson, Lake, Ross.
41. *Crataegus Crawfordiana* Sarg.
 Union.
42. *Crataegus disjuncta* Sarg.
 Mahoning.
43. *Crataegus formosa* Sarg.
 Wood.
44. *Crataegus franklinensis* Sarg.
 Erie, Franklin, Lawrence.
45. *Crataegus gaudens* Sarg.
 Lake, Perry.
46. *Crataegus Gattingeri* Ashe (*C. bedfordensis* Sarg.)
 Cuyahoga, Franklin, Jefferson, Lawrence, Logan, Lorain, Meigs, Preble, Scioto, Warren, Washington.
47. *Crataegus Jessupi* Sarg. (*C. divisifolia* Sarg.)
 Ashland, Franklin, Ottawa.
48. *Crataegus leiophylla* Sarg. (*C. gracilis* Sarg., *C. longipedunculata* Sarg.)
 Harrison, Jefferson, Lorain, Muskingum.
49. *Crataegus locuples* Sarg.
 Clermont, Coshocton, Franklin, Gallia, Highland, Lake.
50. *Crataegus Mackenzii* Sarg., var. *bracteata* (Sarg.) Palmer (*C. bracteata* Sarg.)
 Delaware, Franklin, Meigs.
51. *Crataegus Milleri* Sarg.
 Astabula, Lake.
52. *Crataegus Porteri* Britt.
 Ashtabula, Lake, Muskingum, Portage.
53. *Crataegus rugosa* Ashe (*C. onusta* Ashe)
 Adams, Brown, Carroll, Hamilton, Lawrence, Licking, Lorain, Richland, Tuscarawas, Warren, Washington.
54. *Crataegus virella* Ashe
 Richland.

SERIES XII. COCCINEAE

55. *Crataegus pedicellata* Sarg.
 a. var. *pedicellata* (*C. sejuncta* Sarg.)
 Ashtabula, Auglaize, Clermont, Crawford, Cuyahoga, Fairfield, Franklin, Hamilton, Hardin, Henry, Huron, Jefferson, Lake, Lorain, Ottawa, Putnam, Richland, Trumbull, Vinton, Washington, Wood.
 b. var. **assurgens** (Sarg.) Palmer, stat. nov. (*C. assurgens* Sarg.)
 Ashtabula, Coshocton, Cuyahoga, Geauga, Lake, Lucas, Ottawa, Trumbull, Wood.
 c. var. *Robesoniana* (Sarg.) Palmer (*C. Robesoniana* Sarg.)
 Lake, Richland.
 d. var. *albicans* (Ashe) Palmer (*C. albicans* Ashe, *C. cristata* Ashe)
 Ashtabula, Belmont, Brown, Franklin, Hocking, Huron, Jefferson, Knox, Lake, Licking, Lorain, Lucas, Morgan, Richland, Ross.
56. *Crataegus Holmesiana* Ashe
 a. var. *Holmesiana*
 Cuyahoga, Lorain, Monroe.
 b. var. *amicta* (Sarg.) Palmer (*C. amicta* Sarg., *C. elongata* Sarg.)
 Richland.
57. *Crataegus Habereri* Sarg.
 Jefferson, Lake, Lorain.
58. *Crataegus Hillii* Sarg.
 Lake, Paulding, Richland.
59. *Crataegus pennsylvanica* Ashe
 Clinton, Cuyahoga, Franklin.
60. *Crataegus Pringlei* Sarg.
 Jackson, Lake, Ottawa, Richland, Shelby, Williams.
61. *Crataegus Putnamiana* Sarg.
 Brown, Franklin, Gallia, Lawrence, Licking, Meigs, Washington, Wood.

SERIES XIII. MOLLES

62. *Crataegus mollis* (T. & G.) Scheele
 a. var. *mollis* (*C. redolens* Ashe)
 Auglaize, Belmont, Brown, Butler, Clark, Clermont, Clinton, Darke, Defiance, Delaware, Erie, Franklin, Fulton, Hamilton, Hancock, Hardin, Henry, Highland, Lake, Logan, Lorain, Lucas, Madison, Monroe, Montgomery, Morrow, Ottawa, Paulding, Pickaway, Richland, Sandusky, Seneca, Shelby, Union, Warren, Wayne, Williams, Wood, Wyandot.
 b. var. *sera* (Sarg.) Egglest. (*C. sera* Sarg., *C. mollipes* Sarg.)
 Lake.
63. *Crataegus submollis* Sarg.
 Lake.

SERIES XIV. MACRACANTHAE

64. *Crataegus succulenta* Link.
 a. var. *succulenta* (*C. gemmosa* Sarg., *C. rutila* Sarg.)
 Auglaize, Belmont, Butler, Carroll, Clermont, Fairfield, Franklin, Highland, Hocking, Knox, Lake, Lorain, Lucas, Medina, Ottawa, Portage, Richland, Ross, Shelby, Summit, Union, Wayne, Wood.
 b. var. *macracantha* (Lodd.) Egglest. (*C. macracantha* Lodd.)
 Franklin, Ottawa, Vinton.
 c. var. *michiganensis* (Ashe) Palmer (*C. michiganensis* Ashe)
 Wayne.
 d. var. *neofluvialis* (Ashe) Palmer (*C. neofluvialis* Ashe, *C. tanuophylla* Sarg.)
 Richland.

- e. var. *pertomentosa* (Ashe) Palmer (*C. pertomentosa* Ashe)
Auglaize, Butler, Richland.
- 65. *Crataegus Calpodendron* (Ehrh.) Medic.
 - a. var. *Calpodendron* (*C. pubifolia* Ashe, *C. structilis* Ashe, *C. tomentosa* of many auth.)
Athens, Auglaize, Butler, Clermont, Clinton, Defiance, Erie, Fairfield, Franklin,
Hamilton, Hardin, Lake, Lawrence, Licking, Logan, Lorain, Lucas, Meigs, Mont-
gomery, Ottawa, Perry, Portage, Putnam, Sandusky, Scioto, Stark, Trumbull,
Washington, Wayne, Wood.
 - b. var. *globosa* (Sarg.) Palmer (*C. globosa* Sarg.)
Preble, Wood.
 - c. var. *microcarpa* (Chapm.) Palmer (*C. tomentosa* var. *microcarpa* Chapm., *C. tomentosa*
var. *Chapmani* Beadle, *C. Chapmani* Ashe)
Gallia.
- 66. *Crataegus laetifica* Sarg.
Defiance, Geauga, Lake, Richland.
- 67. *Crataegus prunifolia* (Poir.) Pers.
Lake. (an escape)

HYBRIDS

- Crataegus Calpodendron* x *crus-galli*
Lake, Trumbull.
- Crataegus crus-galli* x *succulenta* var. *macracantha*?
Defiance.
- Crataegus Margaretta* x *mollis*
Preble.
- Crataegus mollis* x *pedicellata*?
Clermont.

It is suspected that several others that have been described as species are of hybrid origin. But in the absence of positive evidence, they are treated under the published names.
