

REVIEW OF *CRATAEGUS* SERIES *APRICA*E, SER. NOV., AND *C. FLAVA* (ROSACEAE)

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ABSTRACT

This paper revises *Crataegus* ser. *Apricae*, ser. nov., remodeled from old ser. *Flavae* after the removal of *C. flava*. Twelve species are recognized in the series, plus a number of other forms which represent possibly undescribed taxa, taxa only known from type gatherings and one more of doubtful serial assignation. Full descriptions and synonymy as well as complete typification are provided for all taxa fully treated. The principal species all have line illustrations and county level distribution maps. Keys distinguish all taxa and unnamed forms recognized. *Crataegus flava*, although transferred to ser. *Intricatae*, is treated here for convenience.

KEY WORDS: *Crataegus* series *Apricae*, ser. nov., taxonomic revision, *C. flava*, ser. *Intricatae*

RESUMEN

En este artículo se revisa *Crataegus* ser. *Apricae*, ser. nov., remodelado de la antigua ser. *Flavae* después de eliminar *C. flava*. Se reconocen doce especies en la serie, además de cierto número de formas que probablemente representan taxa no descritos, taxa sólo conocidos de colección del tipo y uno más de asignación dudosa a la serie. Se aportan descripciones completas y sinonimia así como tipificación de todos los taxa tratados. Las principales especies están ilustradas y tienen mapas de distribución a nivel de condado. En las claves se distinguen todos los taxa y las formas no nombradas que se reconocen. *Crataegus flava*, aunque se haya transferido a la ser. *Intricatae*, se trata aquí por conveniencia.

INTRODUCTION

This paper is the sixth in a series reviewing hawthorns of the southeastern United States, a region for a long time lacking proper revisions after the huge burst of activity at the turn of the last century which culminated in Beadle's (1903) seminal contribution to Small's regional flora. Beadle's treatment of 185 *Crataegus* species for the region, many described by Beadle himself, was based on the collection of hundreds of specimens for the Biltmore Herbarium in which endeavor Beadle was ably assisted by T.G. Harbison. Beadle thus developed unparalleled personal experience although his species concepts have been considered overly narrow. Only one later treatment covered *Crataegus* for the entire region, this being by Tidestrom (1933) in which he recognized 33 species in J.K Small's new flora of the area. As is pointed out in earlier works, e.g., Phipps and Dvorsky (2006), Tidestrom omitted entire series and even the unique species *C. triflora* although it can be found, grossly incorrectly synonymized, under *C. intricata*. The almost complete lack of synonymy further reduces the value of Tidestrom's taxonomy. The *Crataegus* expert Palmer in Vines (1960), a work which covers the 'southwest', an area deemed to reach east to the Mississippi, produced a treatment with 71 species, only 30 of which are in the southeast as routinely interpreted in my papers and which reaches west to Louisiana and Arkansas following Cronquist (1980). Vines' work is illustrated with woodcuts that singularly fail to distinguish any but the most dissimilar species of hawthorn and, largely lacking series *Flavae* in the old sense, therefore does not significantly contribute Palmer's usually valuable insights to the matters addressed in this paper. Later floristic workers produced treatments more in the vein of Tidestrom, as is evidenced, for instance, by their taxon selection and routine omission of *C. triflora*, when it occurred in their areas. The result has been that the southeastern United States, an area very rich in *Crataegus*, has become floristically the worst-served part of the flora of North America area for this genus. Only a few floristic writers bucked this trend, Kurz and Godfrey's (1982) *Crataegus* treatment in their "Trees of Northern Florida" being a good example of this, although, even here, it appears that the authors did not consult types. Murrill's closely observed descriptions of northern Florida hawthorns in the early 1940s, e.g., Murrill (1942), are difficult to match with known species and may represent extremes of variation of them and are here mainly ignored.

It is with this background that examination of over 10,000 specimens for the first author's studies in the southeastern United States *Crataegus* flora, together with numerous field trips to the region which yielded many personal (JBP) collections, as well as the receipt of over 500 duplicate specimens from R. Lance, in addition to experience derived from earlier papers in this series fully confirms Beadle's position that the southeastern United States is a region of great species richness for *Crataegus*. Consequently, treatments like that of Tidestrom can at best be only accepted in part. Nevertheless, a parallel realization is that the *Crataegus* taxonomy of the region is not particularly straightforward even though basic attention to type material permits attaching an appropriate name to nearly all morphotypes encountered. This is so because nearly all Beadle's names can readily be lectotypified if necessary even if those of Ashe cannot (and neotypification of the latter's names is usually fraught with difficulty) and Beadle's names appear sufficient to account almost completely for observed variation. This may all be observed in miniature in the current revision of ser. *Apricae*.

Crataegus series *Apricae* represents a remodeling of series *Flavae* (Loud.) Rehder in the sense used in Palmer (1925), Phipps et al. (2003) and Phipps et al. (1990). In the last two publications mentioned the species lists for ser. *Flavae* were understood to be incomplete, the studies presented here being then worked up. There proved to be more difficult taxonomic problems associated with series *Apricae* than for any other series dealt with so far by the first author for the southeastern United States *Crataegus* flora. These may be listed as follows.

1. For many years floristic authors treated ser. *Flavae* as a very inclusive concept, this generally speaking, being collapsed from the 81 species of Beadle (1903) which that author had organized into 13 groups. Recently, however, the first author (Phipps 1988a), removed most of these groups to ser. *Lacrimatae* and it therefore became necessary to ask whether this action left the residual ser. *Flavae* homogeneous.
2. *Crataegus flava*, type species of ser. *Flavae*, appears to be easily the most distinct species of the series whether or not ser. *Lacrimatae* is included in ser. *Flavae*. This paper formalizes the position, previously suggested in Phipps (1988a), that *C. flava*, the type species, should be removed from the remainder of old ser. *Flavae*.
3. Subsequently, therefore, is the new residuum, after both ser. *Lacrimatae* and *C. flava* are removed, sufficiently homogeneous to exist as a single series?
4. If yes, the question then arises as to an appropriate name for the residual series.
5. None of the species of the series as finally demarcated below appears to be really common and several are very rare or local, limiting the effect of insights from modern fieldwork.
6. Species limits in the new series were sometimes found to be not particularly clear cut, in part because of a relative paucity of material which always makes taxonomic decisions more difficult. This problem is heightened with several species in the series being generally less well-marked than is often the case, particularly in the *visenda* group. Nevertheless, uniting such species carries its own difficulties, especially with the phenetic breadth of the amalgamated species and the fact that variation does not necessarily flow smoothly throughout. On the other hand, species such as *C. frugiferens* would be difficult to unite with anything.

Nevertheless, the study of 274 specimens, including 20 types, from 26 herbaria plus the additional understanding gained from modern fieldwork has created the opportunity to offer the following elaboration of the first author's treatment that will appear in *Flora of North America*, vol. 9. It is rooted in the work of C.D. Beadle (in Small 1903), who knew the group better than anyone else, and who remains the only guide among the earlier generations of botanists. Also note that the first full and accurate description of *Crataegus flava* is provided here for comparative purposes.

TAXONOMIC TREATMENT

The treatment presented here follows the form established for other series of the southeastern United States hawthorns (Phipps 1988a, 1988b; Phipps & Dvorsky 2006a, etc.). This entails detailed series and species descriptions, key to species, full typification, line illustrations of the taxa and county level distribution maps prepared by K. Dvorsky. There is also an appendix of cited specimens. The treatment will commence by elaborating the separation of the new series. A few extra recent collections were added to the list of cited specimens in proof and do not appear in the maps.

The reasons for the exclusion of *Crataegus flava* and the separation of new ser. *Apricae* from ser. *Lacrimatae* are most conveniently summarized as a detailed key, given below. *Crataegus flava* will be placed in

ser. *Intricatae* in the FNA treatment. A combination of plant habit, indumentum, leaf shape, and anther color characters are emphasized.

KEY SEPARATING SER. *APRICA*E FROM SER. *LACRIMATA*E AND *C. FLAVA*

1. Leaves relatively large, 5-8 cm long, thin, mesomorphic; petioles highly glandular with sessile to very short stipitate glands; twigs not flexuous at nodes; stamens 10, anthers purple; fruit narrow-pyriform (unripe) to pyriform (ripe), yellowish to yellow-orange, with somewhat elevated calyx _____ **C. flava**
1. Leaves smaller, 1-5 cm long, slightly to much more xeromorphic; petioles variably glandular but quite without stipitate glands (except in *C. frugiferens*); stamens usually 20, anthers white (cream) or pink to purple; twigs slightly to very zigzag at nodes (except in *C. frugiferens*); fruit subspherical to slightly tapered at base, yellow to red in color, lacking elevated calyx.
 2. Leaves \pm cuneate to \pm parallel-sided; veins exiting near the end of the leaf, often only 1-3 per side; sides lacking lobes for most of their length _____ **ser. *Lacrimatae*, p.p.**
 2. Leaves \pm rhombic, ovate or elliptic; veins exiting between the half-way point and the end of the leaf, frequently 4-6 per side; sides clearly lobed except in a few species with very short leaves (<1 cm long).
 3. Ultimate branches conspicuously lacrimate (except in two dwarf species <1.5 m tall); leaves and inflorescence branches \pm tomentose young; anthers ivory to cream; leaves lobeless or with 1-2 blunt lobes per side (except *C. dispar*, with sharp lobes) _____ **ser. *Lacrimatae*, p.p.**
 3. Ultimate branches not conspicuously lacrimate; leaves variably hairy to glabrous, never tomentose; inflorescence branches glabrous to densely pubescent, never tomentose; anthers usually pink to purple; leaves with 3-4 distinct and usually sharp lobes per side _____ **ser. *Apricae***

Series **Apricae** J.B. Phipps, ser. nov. TYPE SPECIES: *Crataegus aprica* Beadle.

Frutices vel arbores parvae; cortex truncorum interdum ater aut atrocinerus, \pm rimosus, sed raro commemoratus; ramuli vulgo tortuosi sed recti in *C. frugiferenti*, saepe subrufo-brunnei post unum annum; spinae vulgo 1.5–4.5 cm longae, \pm rectae vel leviter recurvatae. Folia decidua, marginibus et petiolis glandulosis; laminae 1.5–5 cm longae, late-ovatae vel rhombo-ellipticae in forma generali; lobi nulli vel 1–3 per latus, vadiosi vel (interdum tantum apiculi) obscure vel raro moderate profundi (et acuti in *C. ignava*); venatio craspedodroma, venis 3–5(6–7 in *C. frugiferenti*) per latus; tenues vel \pm chartaceae. Inflorescentiae (1–)2–6(–7) floratae; rami glabri vel pubescens (interdum dense), ferentes parvas, caducas, lineares, membranaceas, glandulo-marginatas bracteolas. Flores 13–25 mm diam.; hypanthium glabrum vel pubescent (interdum dense); lobi calycis angusto-triangulares, marginibus glandulo-serratis; petala \pm circularia, alba; stamina ca. 20(10), antheris roseis vel purpureis, interdum albis; styli 3–5. Fructus 8–15 mm diam., subglobosi vel globosi, aurantiaco-rubri vel rubri, glabri vel cum pilis raris; lobi calycis reflexi; pyrenae 3–5, dorsaliter sulcatae, lateribus planis.

Shrubs or small trees; bark on trunks seldom recorded, when so, black or dark gray, \pm rimose; most twigs slightly zigzag, except straight in *C. frugiferens*, often reddish brown after 1 yr.; thorns mainly 1.5–4.5 cm long, \pm straight to slightly recurved. Leaves deciduous, margins and petioles glandular; blades 1.5–5 cm long, broad-ovate to rhomb-elliptic in general shape; lobes none or 1–3 per side, if so, shallow (sometimes mere apiculi) or obscurely to more rarely moderately deep (and quite sharply acute in *C. ignava*); venation craspedodromous, 3–5(6–7 in *C. frugiferens*) lateral veins per side; thin to somewhat coriaceous. Inflorescences (1–)2–6(–7) flowered; branches glabrous or pubescent, sometimes densely, bearing small, caducous, linear, membranous, gland-margined bracteoles. Flowers 13–25 mm diam.; hypanthium glabrous or pubescent, sometimes densely so; calyx lobes narrow-triangular, margins glandular-serrate; petals \pm circular, white; stamens usually 20(–10), anthers usually pink to purple, occasionally white; styles 3–5. Fruit 8–15 mm diam., subglobose to spherical, orange-red to red, smooth or with scattered hairs; calyx lobes usually reflexed; nutlets 3–5, dorsally grooved, sides plane.

Series *Apricae* is essentially southern Appalachian/adjacent Piedmont in distribution with some extension into the coastal plain in northern Florida and South Carolina where its species constitute a characteristic element of the *Crataegus* flora in sunny places. Here, 12 species are named with certainty, only a few of which are reasonably common, for instance, *C. mira*. Several more are known only from their types and receive full descriptions. An interesting *Crataegus* flora from the Augusta sandhills of a hundred years ago and now unknown is treated as fully as material permits and special attention is drawn to it. Perhaps it is in the *C. flava* alliance. A full and updated treatment of *C. flava*, except for illustrations, for which the reader is referred to Phipps (1988a), is also provided in this paper because that is where it would customarily be sought and a parallel treatment of ser. *Intricatae* is not anticipated.

Crataegus series *Apricae* represents a remodeling of series *Flavae* (Loud.) Rehder in the sense that was used in Phipps et al. (2003) and Phipps et al. (1990). This is due to the transfer of its type species to ser. *Intricatae*. The species included here belong to Beadle's groups *Euflavae* (minus *C. flava*), *Ignavae*, *Sororiae*, *Segnes* and *Visendae*.

Species limits in the new series were found to be not always very clear cut, in part because of a relative paucity of material, and the present treatment takes a narrow view of specific limits generally following Beadle (1902) and Beadle (1903) because of the potential arbitrariness of lumping in such cases. Beadle knew the group better than anyone else, having described most of the taxa, and remains the only guide among the earlier generations of botanists. None of the species of the series as finally demarcated here appears to be really common and several are very rare or local, limiting insights from modern fieldwork. Some of the taxa recognized could well be local hybrids or apomictic races and the only ploidy level recorded is 3x for a cultivated specimen that might be *C. aprica* (Talent & Dickinson 2005).

KEY TO SERIES APRICAE AND CRATAEGUS FLAVA

1. Twigs \pm zigzag, except in *C. frugiferens*; leaves 2–5 cm long; anthers usually pink to purple; fruit orange-red to red, subglobose.
 2. Stamens 20.
 3. Inflorescence branches tomentose-canescens or scabrous-pubescent.
 4. Inflorescence branches tomentose-canescens; leaf-blades \pm isodiametric; petioles with sessile glands _____ **6. *C. sororia***
 4. Inflorescence branches scabrous-pubescent; leaf-blades ovate to rhombovate or obovate; petioles usually with at least some glands stipitate _____ **11. *C. frugiferens***
 3. Inflorescence branches at most thin-pilose or pubescent.
 5. Leaf-blades suborbiculate to ellipt-rhombic or obovate, lobes of leaf-blades small, mere apiculi, or obscure or lacking.
 6. Blades broad-elliptic-rhombic to suborbicular; lobes clearly present, though small.
 7. At least some leaves usually tending to suborbiculate in shape; lobing small, neat and regular, \pm acute at anthesis, becoming more obscure later in the season; flowers 20–25 mm diam. _____ **7. *C. mira***
 7. No leaves tending to suborbiculate in shape, larger ovate, smaller elliptic to rhombelliptic; lobing somewhat irregular; flowers 15–20 mm diam.
 8. Anthers purple _____ **8. *C. leonensis***
 8. Anthers ivory _____ **13. *C.* sp. cf. *C. annosa***
 6. Blades usually widest distally, if widest in the centre then not even approximately rhombic, with 1-several small and irregular lobes per side, or cuspidate and at the most terminally denticulate; flowers 14–25 mm diam. ('*visenda* group').
 9. Blades smaller, 1.5–3 cm long, broadly or narrowly obovate to rhombovate in general shape, seldom less than 1.5 \times as long as broad; flowers 14–20 mm diam.
 10. Leaves rhombic-elliptic to rhomb-obovate in general shape, the tip cuspidate; many irregularly short-lobed _____ **2. *C. visenda***
 10. Leaves narrow-obovate to narrow-elliptic in general shape, nearly without discernible lobes _____ **3. *C. galbana***
 9. Blades larger, 2–3.5 cm long, broadly elliptic or rhombelliptic to obovate in general shape; flowers 15–18 mm diam. _____ **4. *C. segnis***
 5. Leaf-blades \pm rhombic; lobes well-defined, sharp to somewhat blunt.
 11. Blades 1.5–2.5 cm long; inflorescence branches pubescent _____ **1. *C. egregia***
 11. Blades 2.5–4.0 cm long; inflorescence branches glabrous _____ **9. *C. ignava***
 2. Stamens 10 (occasionally 12–15).
 12. Leaf-blades 3–5 cm long, lobes and teeth sharp; flowers 16–20 mm diam., anthers pink or purple.
 13. Inflorescence branches glabrous; stamens 10 _____ **10. *C. allegheniensis***
 13. Inflorescence branches pilose-pubescent; stamens 12–15 _____ **12. *C. extraria* and *C.* sp. cf. *extraria***
 12. Leaf-blades 2.5–5 cm long, lobes, if any, apiculi; teeth blunt or sharp; flowers 13–16 mm diam.; anthers pink or cream.
 14. Leaves widest near the mid-point, teeth not sharp, \pm coriaceous at maturity; petiolar glands all sessile; anthers cream; inflorescence branches quite densely pilose _____ **5. *C. aprica***

14. Leaves ovate in general shape, sharply toothed, relatively thin at maturity, 2.5–5 cm long; petioles usually with some glands stipitate; anthers pink or cream; inflorescence branches appressed scabrous-pubescent

11. *C. frugiferens*

1. Twigs not zigzag; leaves 5–8 cm long; anthers pink to purple; fruit yellowish, narrow [C. flava (ser. Intricatae), see end of treatment]

1. *Crataegus egregia* Beadle, Biltmore Bot. Stud. 1:82. 1902. (**Fig. 1**). TYPE: U.S.A. FLORIDA. Liberty Co.: Bristol, 24 Aug 1901, T.G. Harbison 4942 (LECTOTYPE SELECTED HERE: A).

Small tree 4–6 m tall; thorns none or several, 3–4 cm long, dark, slender, straight; twigs \pm slender, barely flexuous, bark brown at 1 yr., older grayish; trunk bark dark, very rough. Leaves deciduous; petioles ca. 1 cm long, 30–50% length of blade, slender, pubescent, very glandular; blades 1.5–2.5 cm long at anthesis, 2–3 cm long at maturity; rhombic in general shape, generally with 1 main lobe per side; margins shallowly crenate, teeth gland-tipped; apex acute to subacute, base cuneate; venation craspedodromous, lateral veins ca. 3/side; nearly glabrous on both sides with scattered hairs adaxially young; thin. Inflorescences ca. 3-flowered; branches pubescent, bearing caducous, narrow-oblong, membranous, greenish, gland-bordered bracteoles. Flowers ca. 15 mm diam.; hypanthium thin-pilose; calyx lobes narrow-triangular from a wide base, abaxially glabrous, gland-margined on barely discernible teeth; stamens 20, anthers bright purple, styles 3–4. Fruit 9–12 mm diam., slightly pyriform, red at maturity, glabrous; sepals reflexed; nutlets 3–4, dorsally grooved, sides plane.

Habitat and Distribution.—Most specimens come from Bristol, Florida. It is also recorded from two other locations in Florida as well as several from South Carolina and one each from Alabama and Georgia (Fig. 2). It is a rare species that I (JBP) have not encountered in the field.

Comment.—*Crataegus egregia* is a distinct looking plant with a unique leaf shape which is understood primarily from its type. Herbarium material is in some ways like a large *C. egens* (ser. *Lacrimatae*) but with larger, more rhombic leaf-blades and, where present, longer thorns. South Carolina specimens are thorny, typical material is thornless. Unmapped material represented by about six specimens with similar leaves but more or less tomentose pedicels and much smaller fruit may be the same.

2. *Crataegus visenda* Beadle, Biltmore Bot. Stud. 1:79. 1902. (**Fig. 3**). TYPE: U.S.A. FLORIDA. Liberty Co.: Bristol, 29 Mar 1901, T.G. Harbison 4031 (LECTOTYPE selected here: A).

Crataegus arrogans Beadle, Biltmore Bot. Stud. 1:81. 1902. TYPE: U.S.A. ALABAMA. Russell Co.: Phenix City, 26 Aug 1901, C.D. Beadle 4869 (LECTOTYPE selected here: US).

Crataegus sodalis Beadle, Biltmore Bot. Stud. 1:80. 1902. TYPE: U.S.A. GEORGIA. Burke Co.: Girard, 26 Aug 1901, C.D. Beadle 4868 (LECTOTYPE selected here: NY).

Crataegus tristis Beadle, Biltmore Bot. Stud. 1:84. 1902. TYPE: U.S.A. GEORGIA. Floyd Co.: Rome, 25 Apr 1901, C.D. Beadle 4194 (LECTOTYPE selected here: A).

Large shrub or small tree to 10 m tall; bark on trunk rough, dark gray or brownish; 1 year old twigs dark brown; thorns few to numerous, 1.5–3 cm long, \pm straight, very dark at 1 year. Leaves deciduous; petioles slender, 25–40% length of blade, gland-margined, pilose, winged above; blades 1.5–3.0 cm long, rhomb-elliptic to rhomb-obovate in general shape, not or shallowly 1–2-lobed per side, tip \pm cuspidate; margins obscurely crenate at maturity (sharper younger); venation craspedodromous with 3–4(–5) pairs of lateral veins; when young conspicuously pilose on the veins adaxially, thinly so abaxially, otherwise nearly glabrous. Inflorescences 2–4-flowered; branches nearly glabrous to pilose, bearing caducous, linear, membranous, gland-margined bracteoles. Flowers 14–18 mm diam.; hypanthium externally glabrous to pilose; calyx lobes triangular, margins irregularly serrate and very glandular; petals \pm circular, white; stamens 20, anthers pale to bright purple; styles (2–)3–5. Fruit 10–12 mm diam., subglobose to pyriform, glabrous, orange or orange flushed red to red, calyx lobes recurved; nutlets grooved dorsally, laterally smooth.

Habitat and Distribution.—Nearly all material seen is from northern Florida but there are a few records from southeastern Alabama and southwestern Georgia. *Crataegus visenda* is found in dry woods, on gravelly

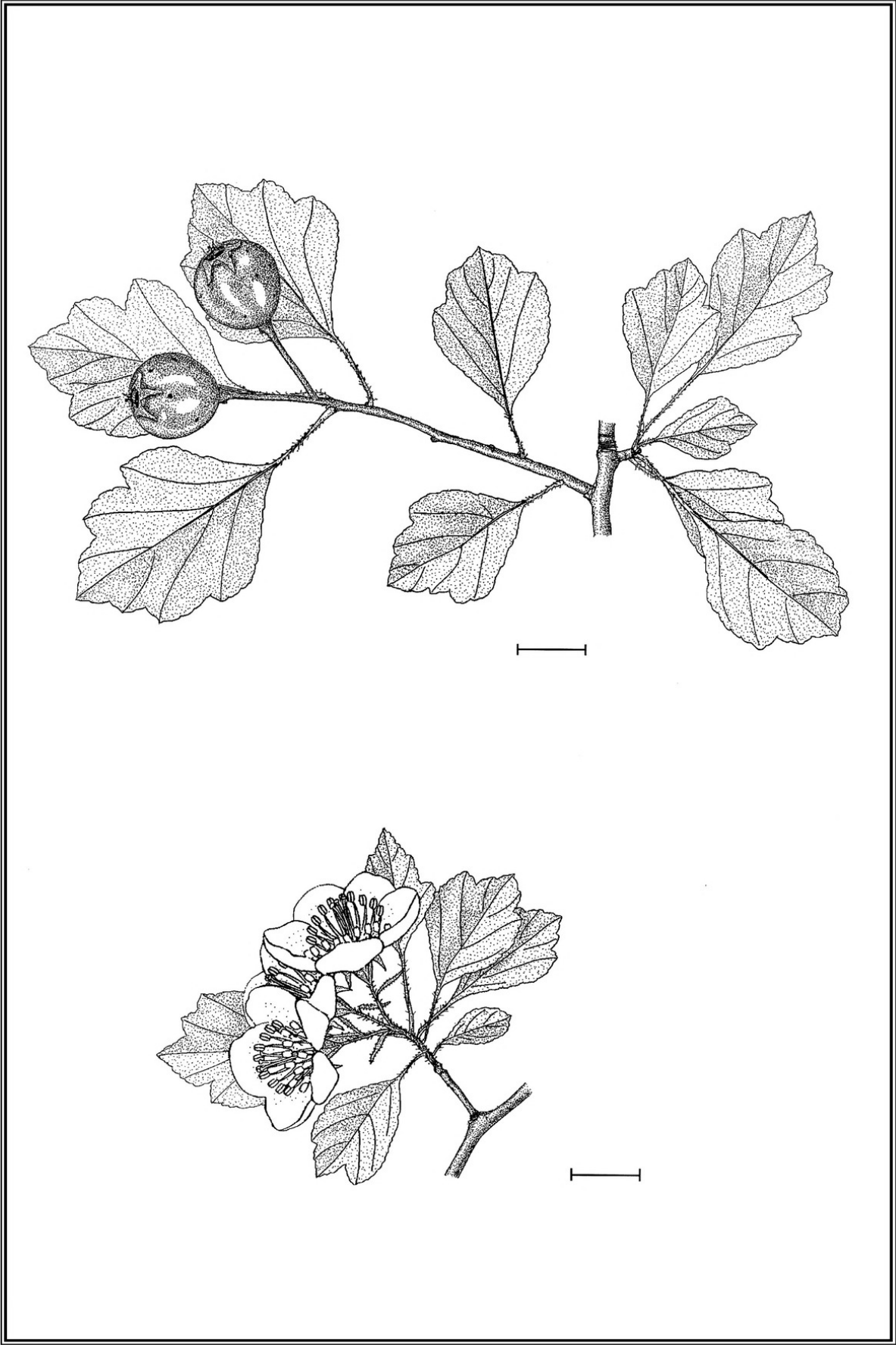


FIG. 1. Line drawing of *Crataegus egregia* from two sheets of *Harbison 4924* (A), flowering and fruiting. Scale bars =1 cm. S. Laurie-Bourque del.

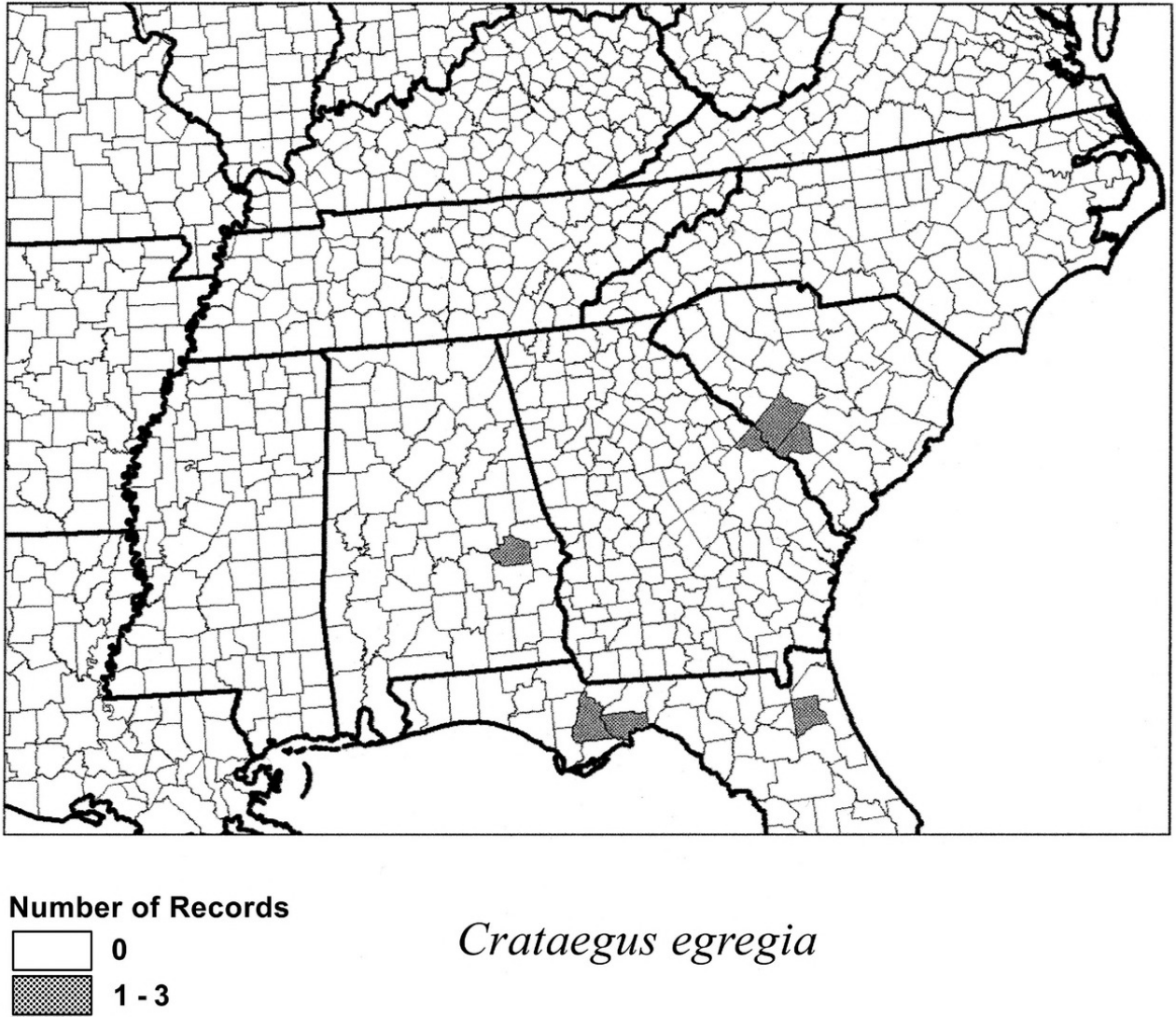


FIG. 2. County level distribution map of *Crataegus egregia*.

ridges and in sandy soil. This species is mapped collectively with *Cc. galbana* and *segnis* as the informal 'visenda group' (Fig. 6).

Comment.—Beadle recognized 10 species in his *Visendae* from which I have removed *C. annosa* and *C. egens*. *Crataegus furtiva*, rather similar to *C. visenda* but with tomentose pedicels and hypanthia, is in ser. *Lacrimatae*.

3. *Crataegus galbana* Beadle, Biltmore Bot. Stud. 1:74. 1902. (Fig. 4). TYPE: U.S.A. FLORIDA. Gadsden Co.: southwest of River Junction, 3 Apr 1900, C.D. Beadle 2083 (LECTOTYPE selected here: NY).

Large shrubs or small trees; twigs somewhat zigzag, at 1 year old dark brown, but partly covered with abraded cutin, later pale to mid gray; thorns none to numerous, 1.5–2.5 cm long, straight, purple-brown at 1 year, gray later. Leaves deciduous; petioles 30–45% length of blade, slender, gland-margined, pubescent; blades 1.5–3 cm long, narrow-obovate to narrow-elliptic in general shape, apex acute to sometimes slightly cuspidate, base ± rapidly narrowed; margins ± devoid of lobes except sometime a few distal half; margins crenate-serrate, the teeth gland-tipped; venation craspedodromous with 3–4 pairs of lateral veins; when young thin hairy adaxially especially on the mid-vein, nearly glabrous abaxially young, except along the mid-vein and in the main axils, ± glabrescent. Inflorescences 1–5-flowered; branches finely pubescent, bearing several caducous, narrow-oblong, membranous, gland-margined bracteoles. Flowers 14–20 mm

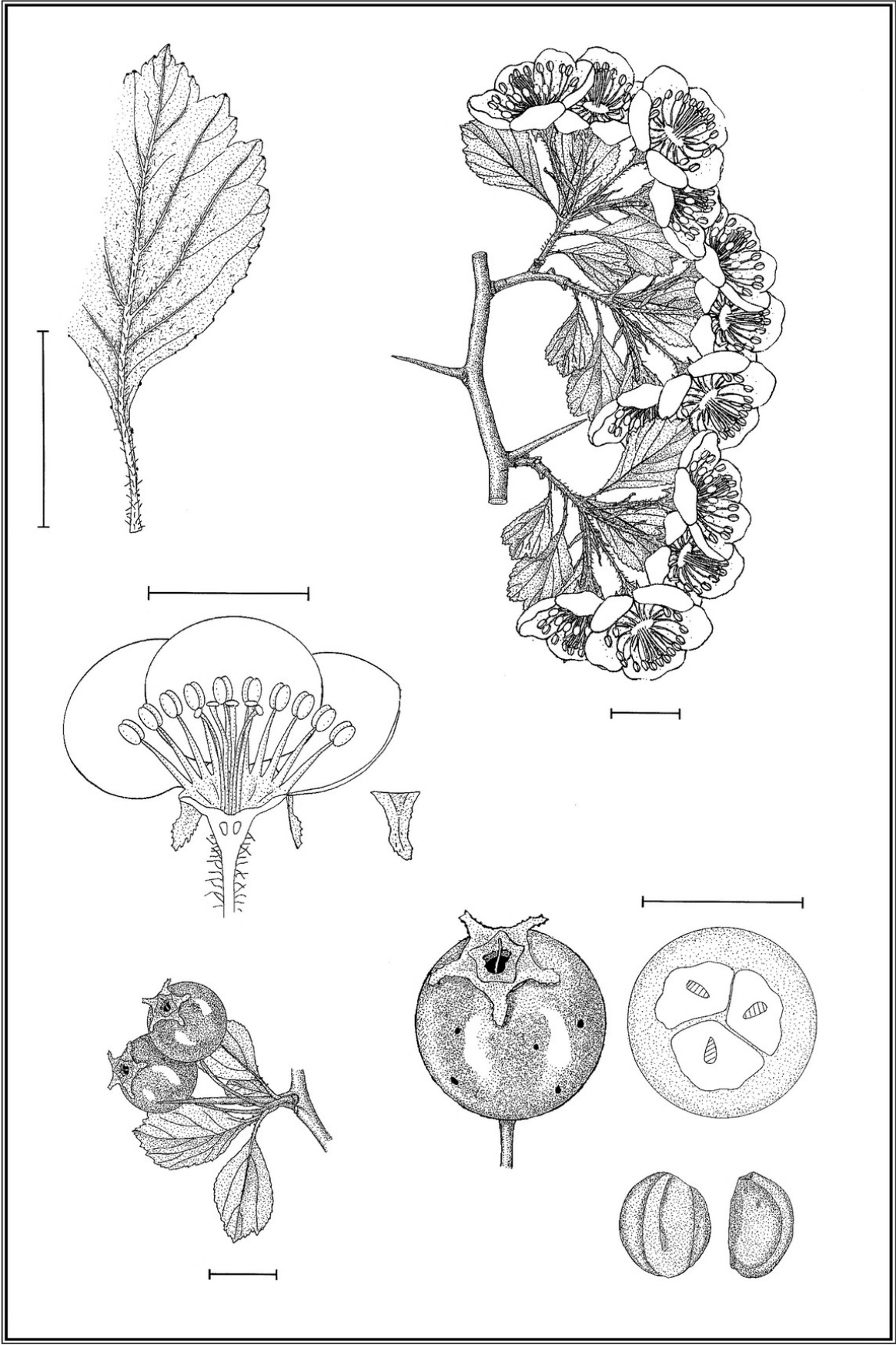


FIG. 3. Line drawing of *Crataegus visenda* from Lance 2114 (UW0), flowering and Godfrey 79895 (UW0), fruiting. Scale bars =1 cm. S. Laurie-Bourque del.

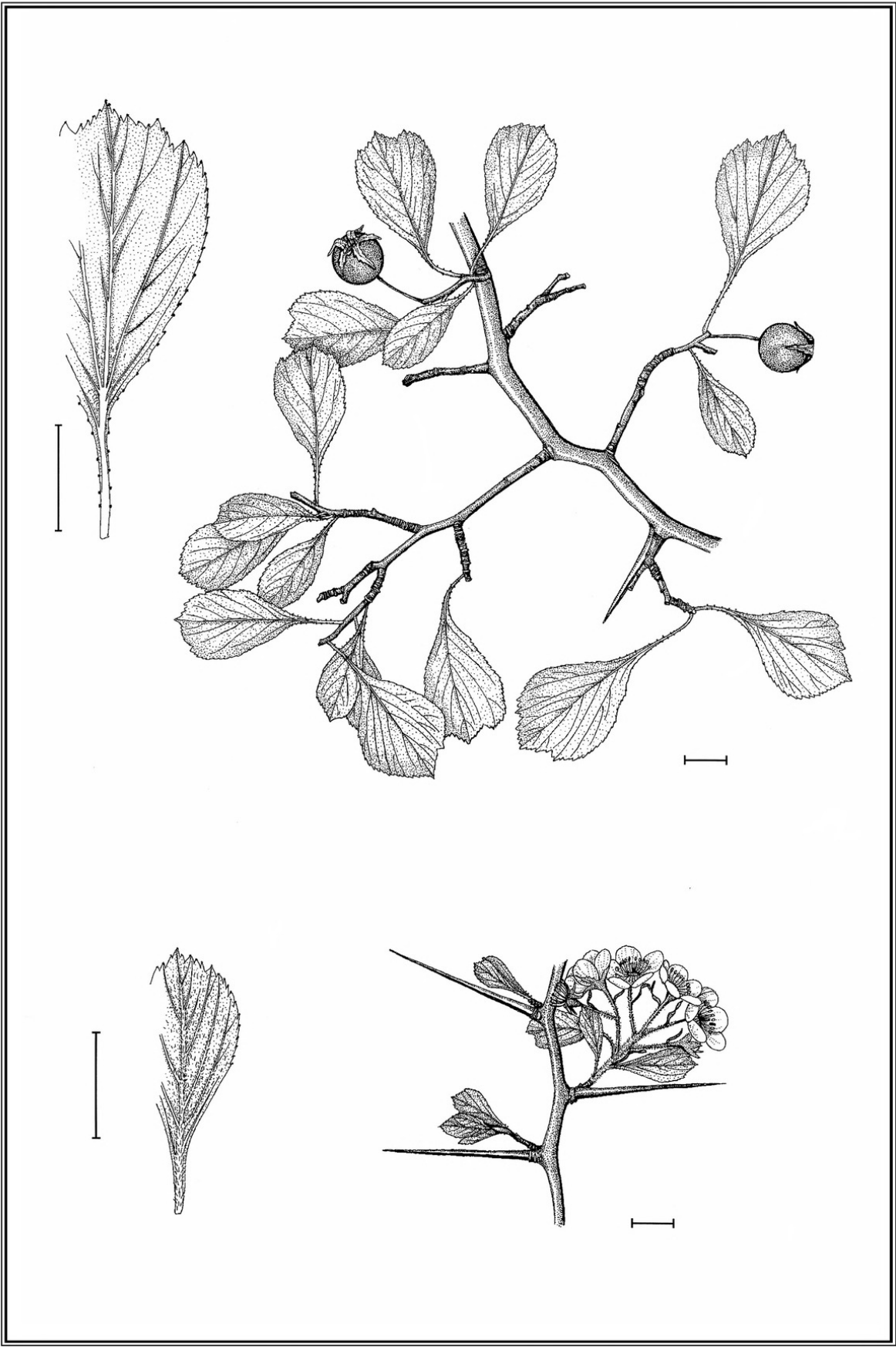


FIG. 4. Line drawing of *Crataegus galbana* from *Cuthbert* 1 (FLAS) and *Duncan* 2832 (GA), fruiting and *Duncan* 4116 (GA) and *Porter* 343 (USCH), flowering. Scale bars = 1 cm. S. Laurie-Bourque del.

diam.; hypanthium externally thinly pilose; calyx lobes triangular, margins glandular and strongly serrate, abaxially glabrous; petals \pm circular, white; stamens 20, anthers pale purple; styles 3–5. Fruit 10–15 mm diam., subglobose, glabrous, orange flushed red to red; calyx lobes recurved; nutlets ca. 3–5, grooved dorsally, laterally smooth.

Habitat and Distribution.—Locally common in the Florida Panhandle, *Crataegus galbana* ranges to south-central Alabama throughout Georgia to South Carolina with two records from North Carolina. It occurs in open woodland and scrubby places. This species is mapped collectively with *Cc. visenda* and *segnis* as the informal ‘visenda group’ (Fig. 6).

Comment.—*Crataegus galbana* is the least similar to *C. visenda* of this group of species and might perhaps be confused with *C. aprica*. Nevertheless, the smaller, differently shaped leaves and 20 pale purple anthers will readily distinguish it from *C. aprica*. A good many specimens of this species were annotated ‘*C. consanguinea*’.

4. *Crataegus segnis* Beadle, Biltmore Bot. Stud. 1:32. 1901. (**Fig. 5**). TYPE: U.S.A. ALABAMA. Butler Co.: Greenville, 24 Aug 1901, C.D. Beadle 2155² (LECTOTYPE selected here: A).

Crataegus consanguinea Beadle, Biltmore Bot. Stud. 1:34. 1901. TYPE: U.S.A. FLORIDA. Leon Co.: W of Tallahassee, 28 Mar 1900, C.D. Beadle 2044 (LECTOTYPE selected here: US).

Large shrubs or small trees; twigs somewhat zigzag, at 1 year old dark brown, but partly covered with abraded cutin, later pale to mid gray; thorns none to numerous, 1.5–2.5 cm long, straight, purple-brown at 1 year, gray later. Leaves deciduous; petioles slender, 30–45% length of blade, slender, gland-margined, pubescent; blades 1.5–2.5 cm long, broadly elliptic or rhombelliptic to obovate in general shape, apex acute and often somewhat cuspidate, base \pm rapidly narrowed; usually not but sometimes very obscurely lobed, margins crenate-serrate, the teeth gland-tipped; venation craspedodromous with 3–5 pairs of lateral veins except in the smaller leaves; when young thin hairy adaxially especially on the mid-vein, nearly glabrous abaxially young, except along the mid-vein and in the main axils, \pm glabrescent. Inflorescences 1–5-flowered; branches quite long pilose, bearing several caducous, narrow-oblong, membranous, gland-margined bracteoles. Flowers ca. 15–18 mm diam.; hypanthium externally thinly pilose; calyx lobes triangular, margins irregularly strongly glandular and serrate, abaxially glabrous; petals \pm circular, white; stamens 20, anthers pale purple; styles 3–5; Fruit 10–15 mm diam., subglobose, glabrous, orange flushed red to red; calyx lobes recurved; nutlets ca. 3–5, grooved dorsally, laterally smooth.

Habitat and Distribution.—*Crataegus segnis* occurs around Greenville, Alabama and in northern Florida. This species is mapped collectively with *Cc. visenda* and *galbana* as the informal ‘visenda group’ (Fig. 6).

Comment.—This species has generally the largest and broadest leaves in the *visenda* group. The fruit is subglobose and red.

5. *Crataegus aprica* Beadle, Bot. Gaz. 30:335. 1900. (**Fig. 7**). TYPE: U.S.A. NORTH CAROLINA. Buncombe Co.: Biltmore, 11 May 1899, Biltmore Herb. C14 (LECTOTYPE selected here: NY).

Shrubs, generally 2–3 m tall; branchlets somewhat flexuous; extending twigs olive-green with somewhat sparse pubescence; 1-year old twigs reddish-brown, pubescent, older dark gray-brown glabrous; 2-year old thorns 3–4 cm long, slender, straight or recurved; dark gray-brown. Leaves deciduous; petioles 3–8 mm long, 30–50% length of blade, pubescent, glandular; leaf blades 1.5–4 cm long, the blades rhomb-elliptic or broad-elliptic in general outline, widest in the middle, apically blunt, sharply constricted at the base and tapered into the winged upper petiole; extremely shallowly lobed to unlobed, lobes more prominent (mere apiculi) young; margins crenate or obtusely serrate, the teeth gland-tipped; venation craspedodromous, with 3–4 lateral veins per side; surfaces pilose above when young but glabrescent later, glabrous below except on the midvein; \pm coriaceous at maturity. Inflorescences 3–6 flowered; branches \pm densely pilose, bearing caducous, linear, membranous, gland-margined bracteoles; anthesis April. Flowers 13–15 mm diam.; hypanthium pilose, at least near the base; calyx lobes ca. 4 mm long, narrow triangular, gland-toothed, sparsely pubescent abaxially, with a prominent mid-vein in some; petals \pm circular, white; stamens 10, anthers ivory

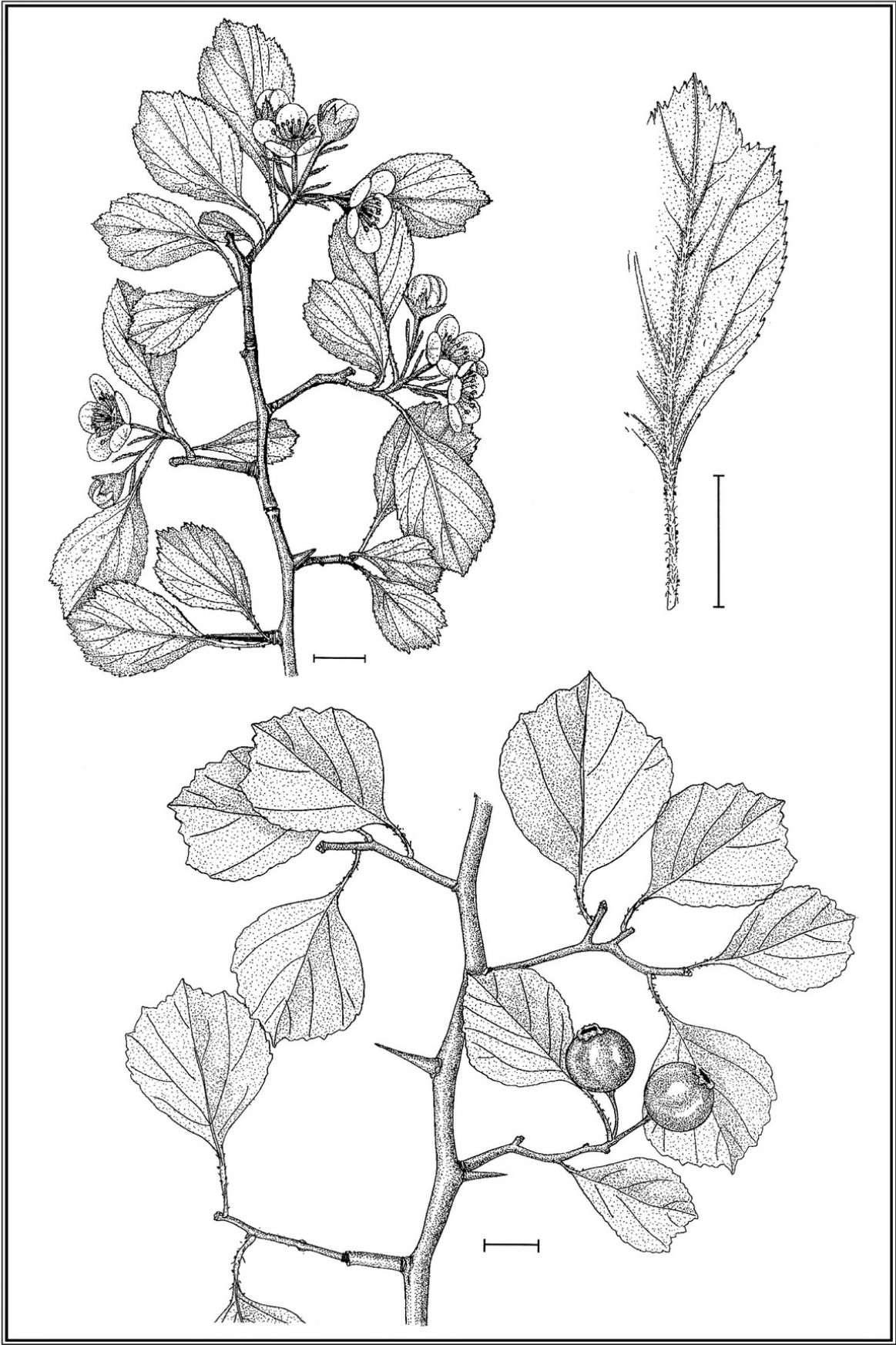


FIG. 5. Line drawing of *Crataegus segnis* from photo of Beadle 2044 (US), flowering and Beadle 2155² (A), fruiting. Scale bars = 1 cm. S. Laurie-Bourque del.

or cream; styles 3–5. Fruit 9–15 mm diam., \pm orbicular, with a few hairs, red or reddish-orange; calyx lobes patent-reflexed; nutlets 3–5, dorsally sulcate, laterally smooth.

Common Name.—Sunny Hawthorn.

Habitat and Distribution.—*Crataegus aprica* is found mainly around the southern end of the Appalachians from northern Florida to Virginia with a single record each for Alabama and Tennessee (Fig. 8). It occurs at 50–3000 ft in open brushy areas where it may be quite common.

Comment.—Vegetatively, *C. aprica* is not unlike members of the *visenda* group but it has 10 stamens and ivory anthers. The record from Barbour Co., Alabama has a thinner inflorescence tomentum and generally larger (3.0–4.5 cm long), longer petiolate (1.5–2.0 cm long), thinner leaves.

6. *Crataegus sororia* Beadle, Bot. Gaz. 30:336. 1900. (**Fig. 9**). TYPE: U.S.A. GEORGIA. Floyd Co.: hills above Silver Creek, Rome, 18 Sep 1897, C.D. Beadle 1257 (LECTOTYPE selected here: A).

Shrubs, generally 2–3 m tall; trunk bark rimose; branchlets somewhat flexuous; extending twigs olive-green with somewhat sparse pubescence; 1-year old twigs reddish-brown, pubescent, older dark gray-brown glabrous; 2-year old thorns 3–4 cm long, slender, straight or recurved; dark gray-brown. Leaves deciduous; petioles 3–8 mm long, 30–50% length of blade, pubescent, glandular; leaf blades 1.5–4 cm long, the blades broad-elliptic to circular in general outline, widest in the middle, apically blunt, sharply constricted at the base and tapered into the winged upper petiole; rather sharply lobed, lobes more prominent young; margins finely serrate, the teeth gland-tipped; venation craspedodromous, with 3–4 lateral veins per side; surfaces pilose above when young but glabrescent later, glabrous below except on the midvein; \pm coriaceous at maturity. Inflorescences 3–6 flowered; branches tomentose, bearing caducous, linear, membranous, gland-margined bracteoles; anthesis April. Flowers ca. 15 mm diam.; hypanthium densely pilose; calyx lobes ca. 4 mm long, narrow triangular, gland-toothed, sparsely pubescent abaxially, with a prominent mid-vein in some; petals \pm circular, white; stamens 20, anthers ivory, pink-purple or red; styles 4–5. Fruit 12–18 mm diam., \pm orbicular, with a few hairs, reddish-orange; calyx lobes patent-reflexed; nutlets 4–5, dorsally sulcate, laterally smooth.

Habitat and Distribution.—*Crataegus sororia* occurs around Rome, Georgia where it is still common, in adjacent areas of Alabama and in Aiken Co., South Carolina (Fig. 10). It is found in open scrubby areas.

Comment.—This species, most similar to *C. aprica*, differs in leaf shape (proportionately broader), stamen number and anther color. Beadle (1900) says that *C. sororia* is found south to Florida but I have not seen specimens of it from that state.

7. *Crataegus mira* Beadle, Biltmore Bot. Stud. 1:78. 1902. (**Fig. 11**). TYPE: U.S.A. GEORGIA. Cobb Co.: 9 May 1901, C.D. Beadle 4287 (HOLOTYPE selected here: US).

Shrubs, generally 2–3 m tall; branchlets somewhat flexuous; extending twigs olive-green with somewhat sparse pubescence; 1-year old twigs reddish-brown, pubescent, older dark gray-brown glabrous; 2-year old thorns 3–4 cm long, slender, straight or recurved; dark gray-brown. Leaves deciduous; petioles 3–8 mm long, 30–50% length of blade, pubescent, glandular; leaf blades 2–3.5 cm long, the blades broad rhomb-elliptic to \pm circular in general outline, widest in the middle, apically acute, sharply constricted at the base and tapered into the winged upper petiole; shallowly but sharply lobed, lobes more prominent young; margins crenatoserrate to serrate, the teeth particularly prominent around anthesis, gland-tipped; venation craspedodromous, with 3–4 lateral veins per side; surfaces pilose above when young but glabrescent later, glabrous below except on the midvein; \pm coriaceous at maturity. Inflorescences 3–6 flowered; branches glabrous to pilose, bearing caducous, linear, membranous, gland-margined bracteoles; anthesis April. Flowers 20–25 mm diam.; hypanthium thin-pilose to more or less glabrous; calyx lobes ca. 5 mm long, narrow triangular, gland-toothed, sparsely pubescent abaxially, with a prominent midvein in some; petals \pm circular, white; stamens 10–20, anthers cream or purple; styles 4–5. Fruit 9–15 mm diam., \pm orbicular, with a few hairs, red or reddish-orange; calyx lobes patent-reflexed; nutlets 4–5, dorsally sulcate, laterally smooth.

Habitat and Distribution.—The main range of *C. mira* is the Florida panhandle to central Georgia but

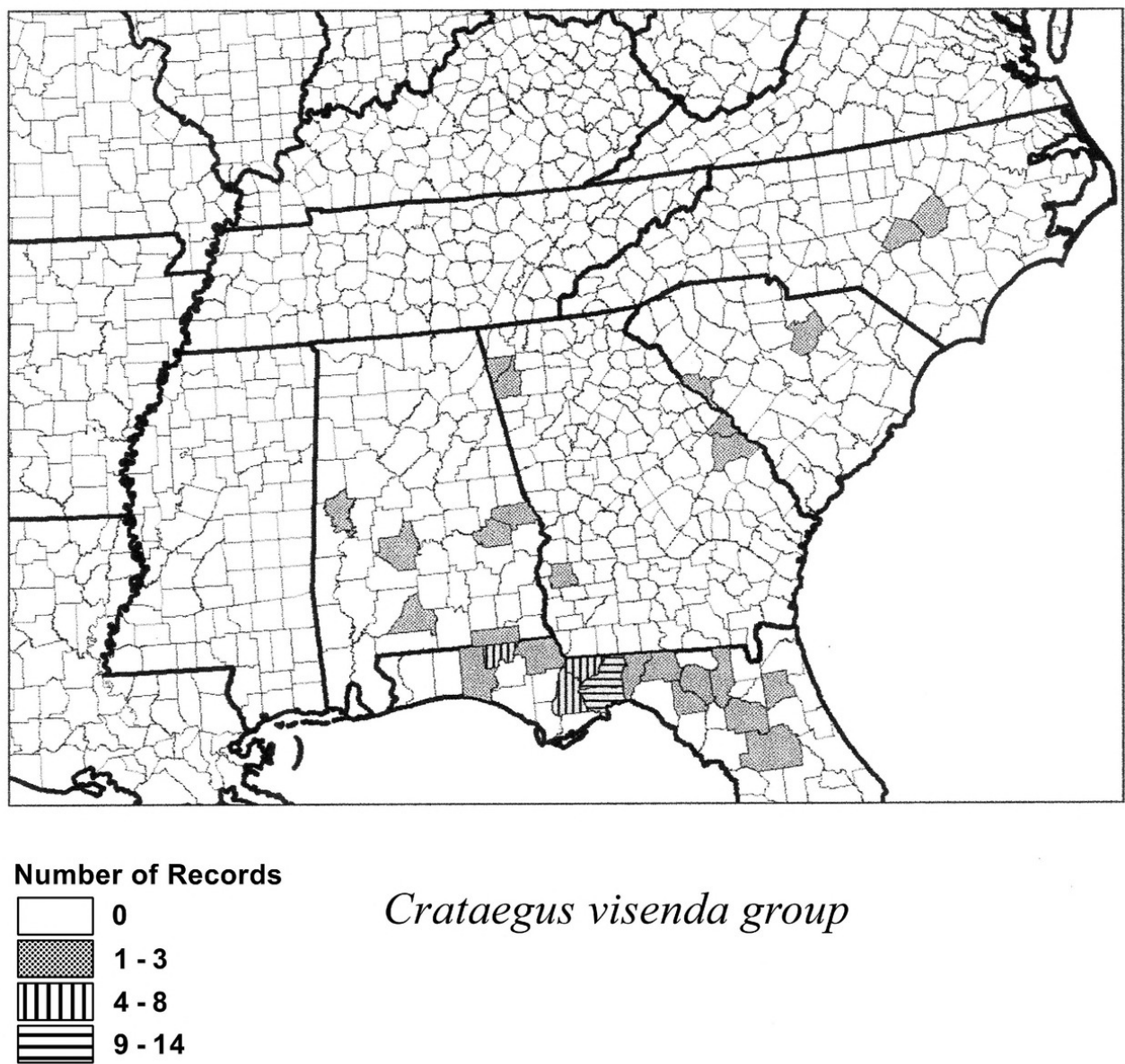


FIG. 6. County level distribution map of *visenda* group.

it extends to the Carolinas and Alabama (Fig. 12). It is found in open brushy areas where it may be quite common.

Comment.—This striking species is most similar to *Crataegus sororia* and *C. aprica* but differs in its broader and often larger leaves, thinner inflorescence indumentum and larger flower size.

8. *Crataegus leonensis* E.J. Palmer, J. Arnold Arbor. 13:422. 1932. TYPE: U.S.A. FLORIDA. Leon Co.: near Tallahassee, 3 Apr 1923, T.G. Harbison 6072 (HOLOTYPE, A).

Tree 10–12 m tall, with wide-spreading intricate branches; trunk bark thick, ridged, dark gray to nearly black; twigs somewhat zigzag, very dark at 1 yr.; thorns sparse, to 3.5 cm long, straight, very dark at 1 yr. Leaves deciduous; petioles slender, 25–30% length of blade, extremely glandular, pubescent in the sulcus; blade 2.5–3.5 cm long, oblong to rhombovate or narrowly obovate in general shape, tip acute; base cuneate; sides obscurely or very shortly 1–2 lobed; margins finely to obscurely crenate-serrate, the teeth gland-tipped; venation craspedodromous, 3–4 veins per side; nearly glabrous but with some pilosity along the main veins adaxially and abaxially (Palmer implies glabrous abaxially); rather thin. Inflorescences 3–7 flowered;

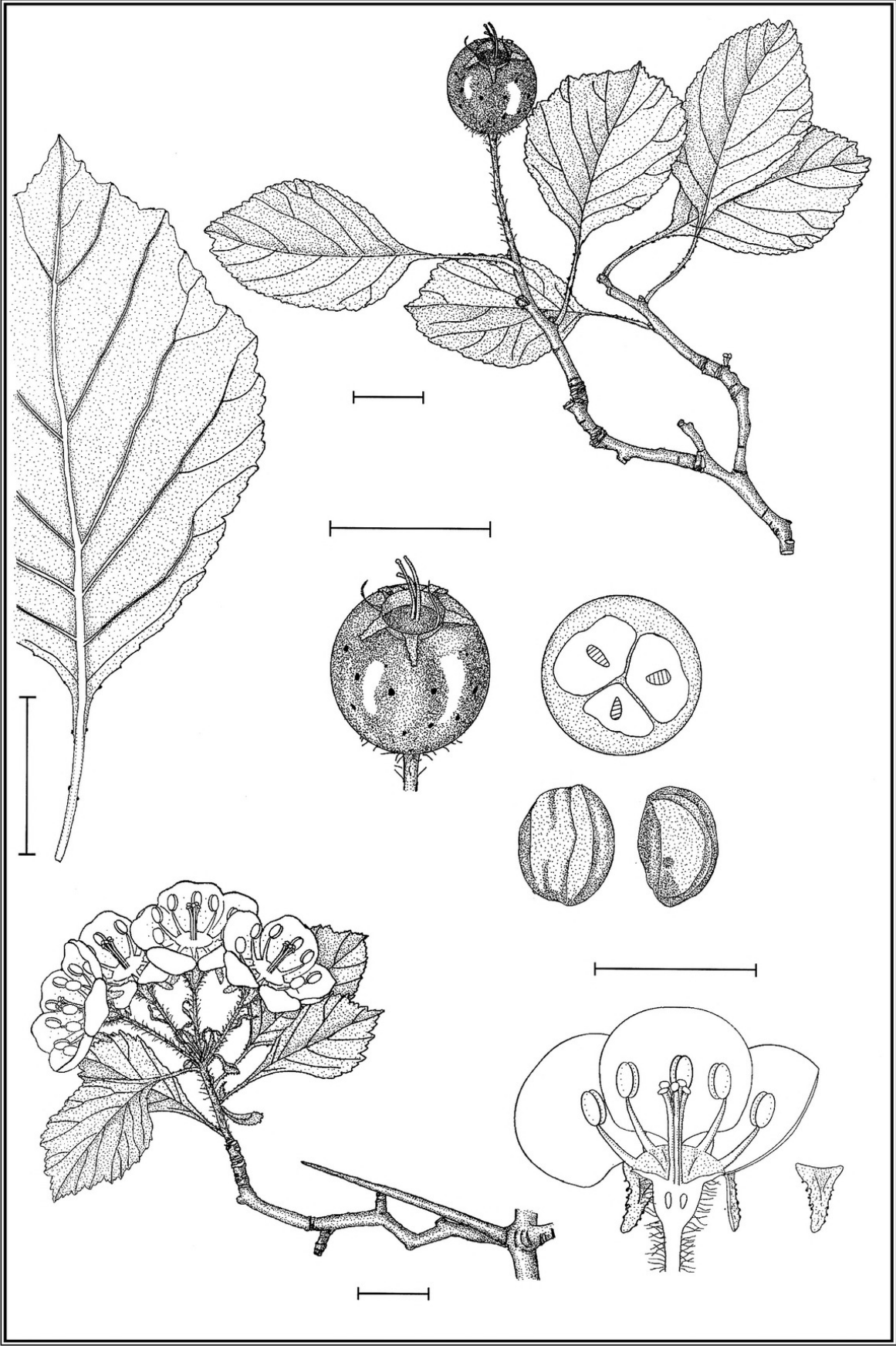


FIG. 7. Line drawing of *Crataegus aprica* from Phipps 5681 (UWO, cult. at K), flowering and Ulf-Hansen 119 (UWO), fruiting. Scale bars =1 cm. S. Laurie-Bourque del.

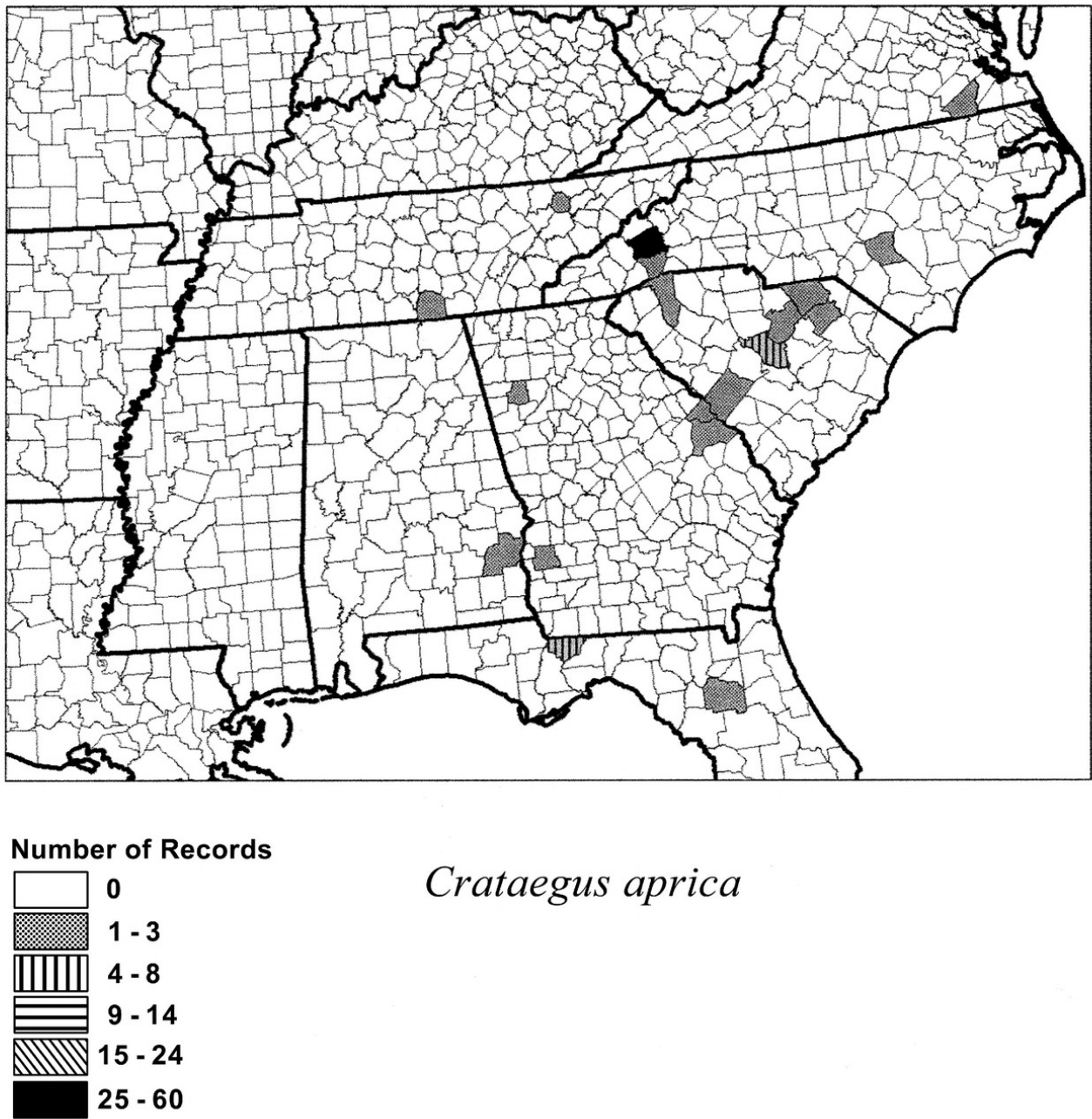


FIG. 8. County level distribution map of *Crataegus aprica*.

branches subglabrous to moderately pilose, bearing narrow-oblong, caducous, membranous, gland-bordered bracteoles. Flowers 16–20 mm diam., hypanthium glabrous externally; calyx lobes triangular, glandular-seriate, abaxially glabrous; stamens 20, anthers pink; styles 2–5. Fruit 9–12 mm diam., subglobose, glabrous, orange-red to russet, or often green-mottled; calyx lobes somewhat elevated, spreading, prominent; nutlets (2–)3–4(–5), dorsally grooved, laterally plane.

Habitat and Distribution.—This is a local species mainly known from Leon Co., Florida. A few specimens are also known from southern Georgia (Fig. 10). It is recorded from sandy upland woods.

Comment.—*Crataegus leonensis* is similar to *C. mira*, but it has smaller flowers than that species and differently shaped leaves (see key). It is possibly just an extreme form of *C. mira* but more field study of these two entities is needed to determine this. One of the flowering specimens on Canby & Sargent 27 (DOV) from Chattahoochee, Georgia has a much more pubescent inflorescence but is otherwise indistinguishable. Murrill's *C. subflavida* is perhaps the same but has larger yellow fruit.

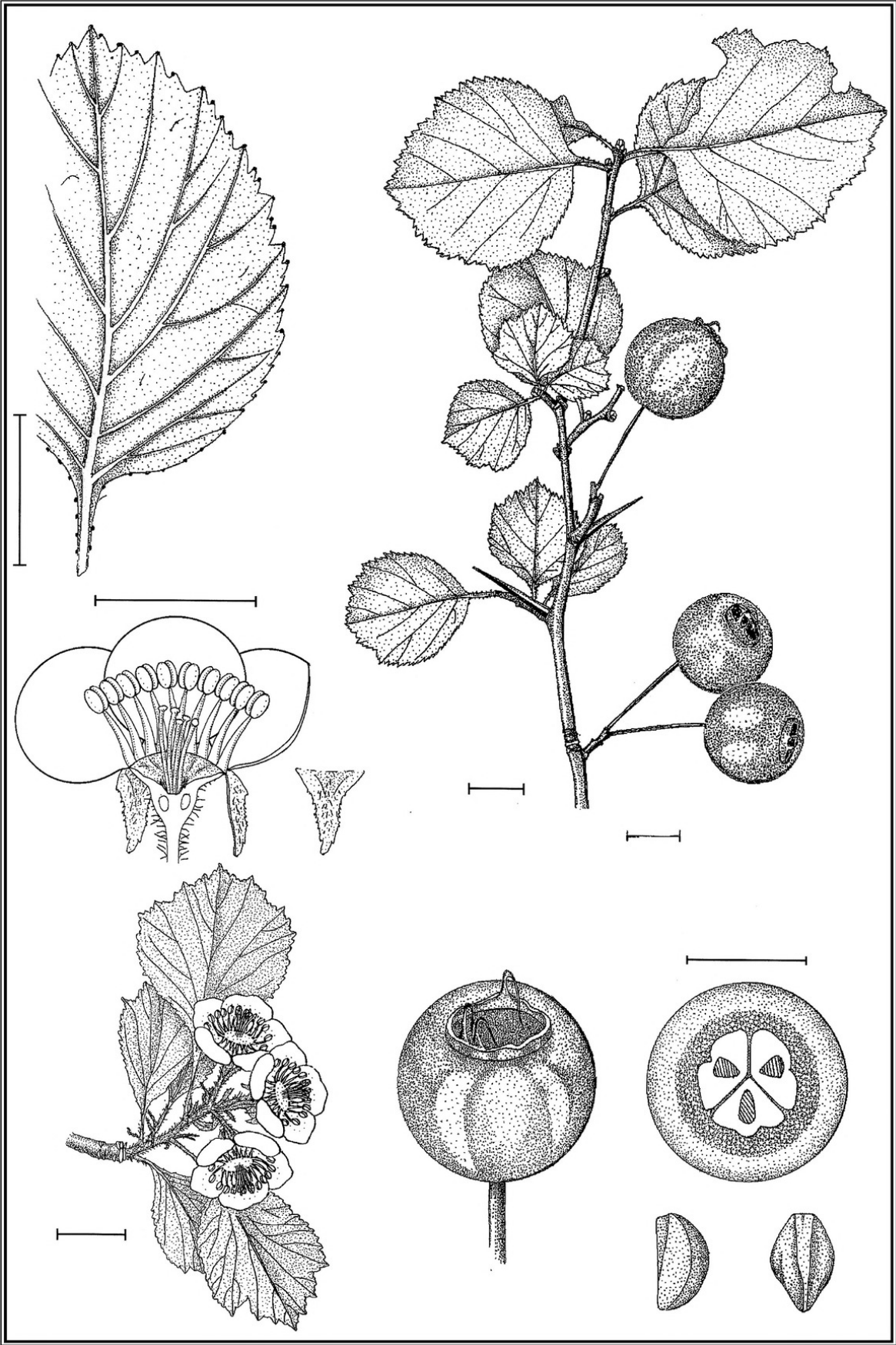
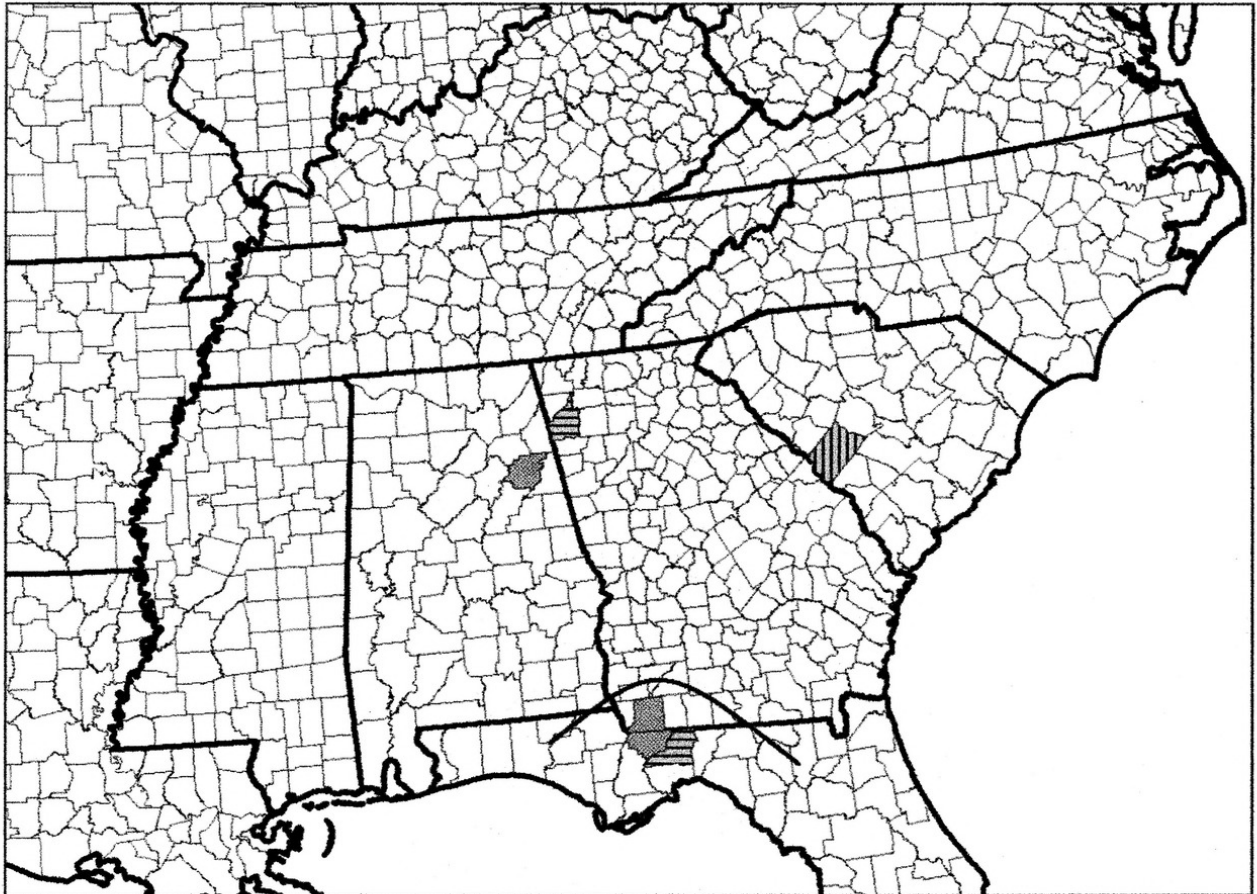


FIG. 9. Line drawing of *Crataegus sororia* from Ulf- Hansen 020 (UWO), flowering and Phipps 5176 (UWO), fruiting. Scale bars =1 cm. S. Laurie-Bourque del.



Number of Records

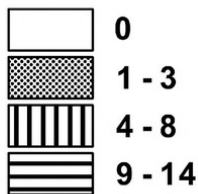
*Crataegus leonensis* and *C. sororia*

FIG. 10. County level distribution map of *Crataegus sororia* (northern) and *C. leonensis* (southern). The two species are separated by the curved line.

9. *Crataegus ignava* Beadle, Biltmore Bot. Stud. 1:31. 1901. (**Fig. 13**). TYPE: U.S.A. ALABAMA. De Kalb Co.: Lookout Mountain, Valley Head, Oct 1900, *C.D. Beadle* 2289² (LECTOTYPE selected here: US).

Shrubs, 2–4(–5) m tall; \pm thorny, thorns 2–3 cm (3–5) long at 2-yr. old, straight, \pm fine, black; extending shoots glabrous; 1-yr old tan to chestnut, shiny; older \pm dark gray, often reddish tinged. Leaves deciduous; petioles ca. 1 cm long, glabrous, black-glandular; blades ca. 2.5–3.5 cm long in our material, narrow-ovate to ovate-rhombic or broad-ovate in general shape; acute at the tip and wide-cuneate or somewhat rounded at the base; with 2–3 sharp lobes on either side; margins obscurely crenate-serrate, the teeth gland-dotted; venation craspedodromous, lateral veins 4–5 per side; thinly pilose above when young, but soon glabrescent, \pm coriaceous at maturity. Inflorescences 2–5 flowered; branches glabrous, bearing numerous caducous, linear, herbaceous to membranous, gland-margined bracteoles. Flowers ca. 15 mm wide; hypanthium externally glabrous; calyx lobes 6 mm long, narrow-triangular, abaxially glabrous, the margins glandular-serrate; petals \pm circular, white; stamens 20, anthers pale pink (pale purple); styles (3–5). Fruit 10–17 mm diam., subglobose, orange-red; calyx lobes spreading-recurved; nutlets 3–5, dorsally furrowed, laterally plane.



FIG. 11. Line drawing of *Crataegus mira* from Lance 2121 (UWO), flowering and Phipps 6684 (UWO), fruiting. Scale bars =1 cm. S. Laurie-Bourque del.

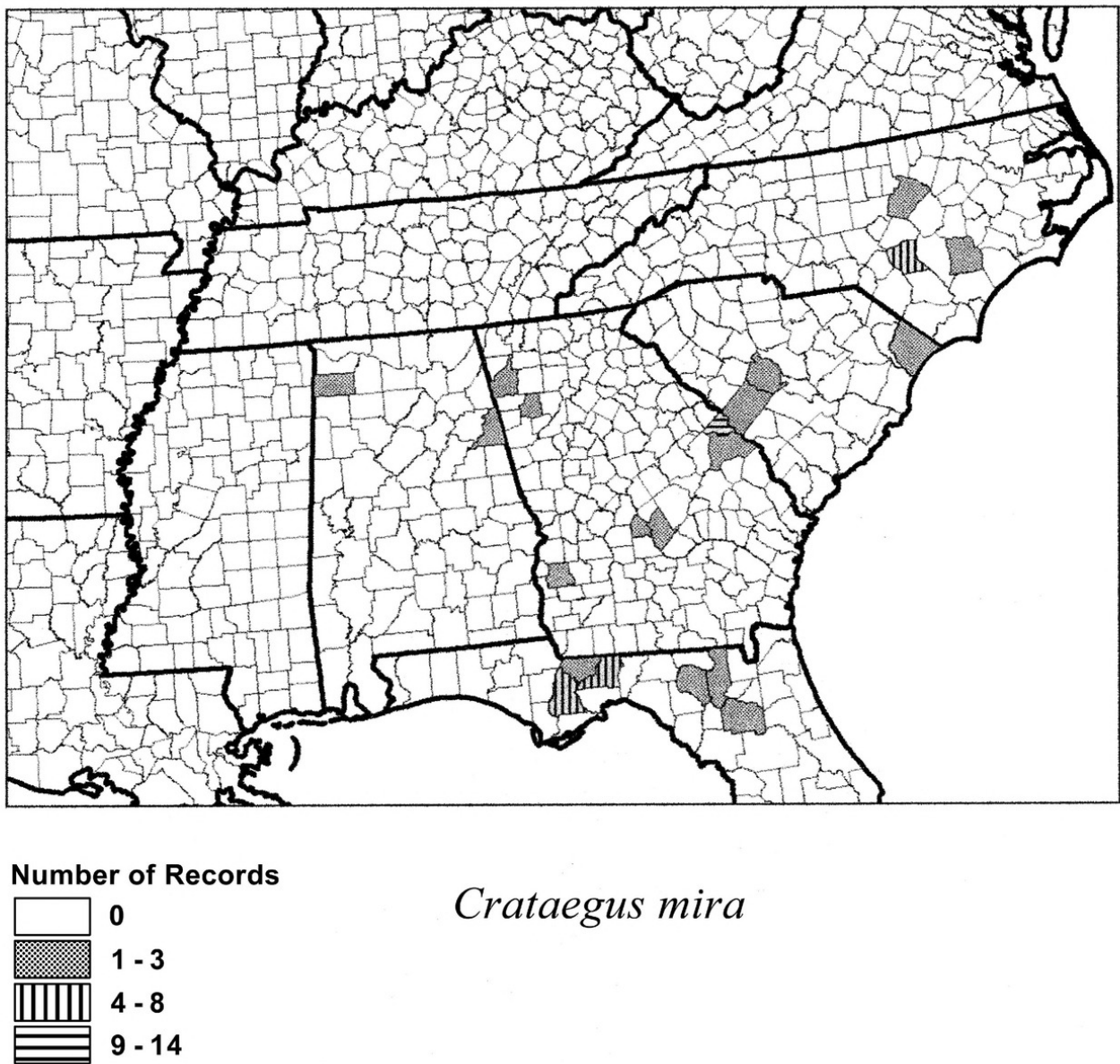


FIG. 12. County level distribution map of *Crataegus mira*.

Habitat and Distribution.—*Crataegus ignava* is a locally common plant of east-central Alabama and north-central and central Georgia (Fig. 14). The senior author has collected it from rocky hills bearing stunted trees of this species near Anniston, Alabama and red soils in central Georgia.

Comment.—If Murrill's *C. subflavida* is the same, this species also occurs near Gainesville, Florida. *Crataegus ignava* can be a very handsome plant with its bright orange-red fruit, which is sometimes very large, and striking foliage.

10. *Crataegus allegheniensis* Beadle, Bot. Gaz. 30:337. 1900. (**Fig. 15**). TYPE: U.S.A. ALABAMA. De Kalb Co.: Lookout Mountain, Valley Head, 7 May 1900, C.D. Beadle 2290 (LECTOTYPE selected here: US).

Shrubs, 2–4(–5) m tall; thorns at 2 yrs 1.5–4 cm long, straight or slightly recurved, deep chestnut brown to blackish; extending twigs reddish, glabrous, at 1 yr old reddish-gray, older gray. Leaves deciduous; petioles 0.75–1.5 cm long, very glandular, glabrous; blades (2–)3–5 cm long elliptic-ovate in general shape, acute above, broadly cuneate below with about 3 sharp lobes per side, LII ca. 15%; margins finely toothed, the teeth with small glands; venation craspedodromous, with ca. 5 pairs of veins; upper surface pilose when

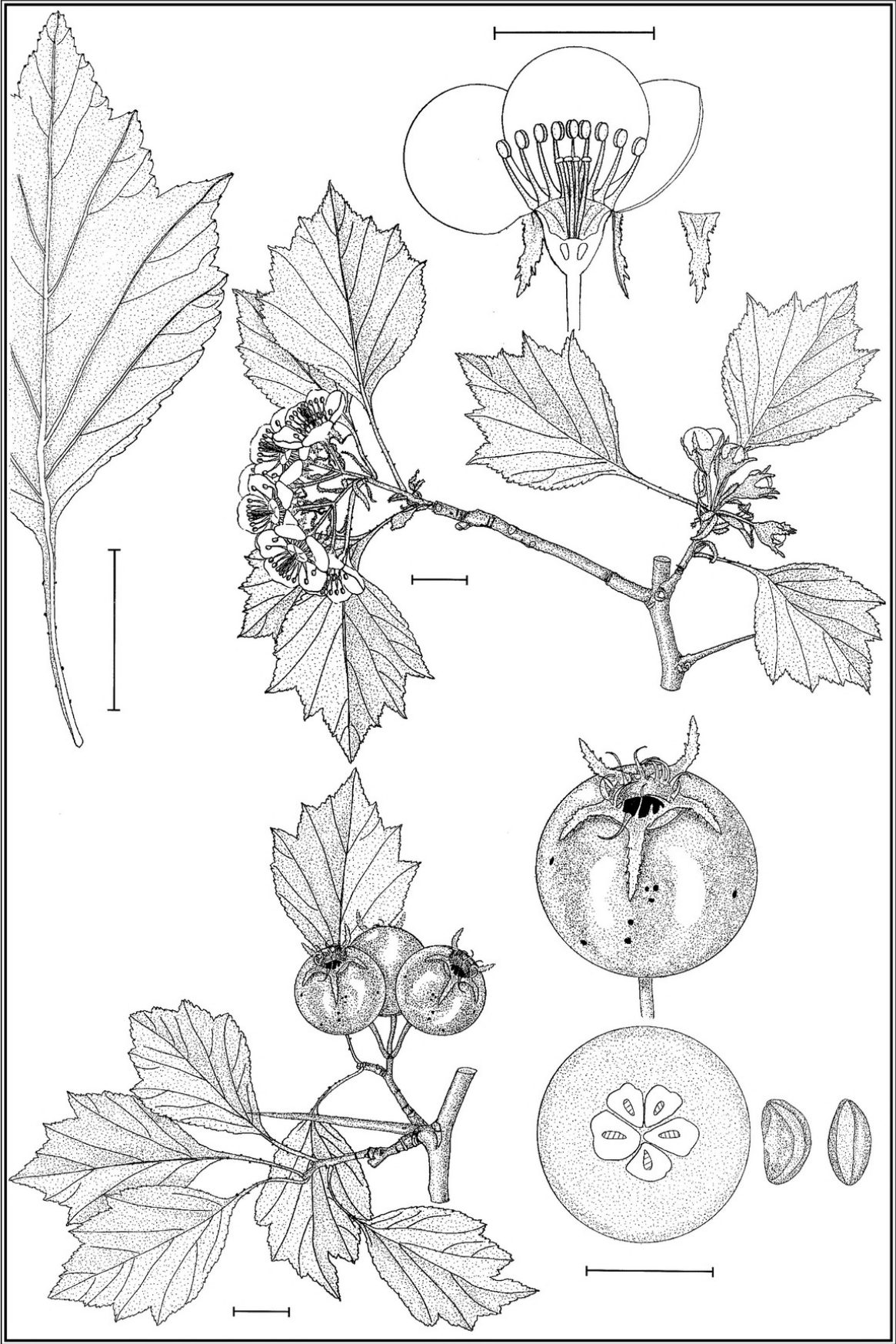


FIG. 13. Line drawing of *Crataegus ignava* from Smith & Spaulding 4 (UWO), flowering and Phipps 7783 (UWO), fruiting. Scale bars = 1 cm. S. Laurie-Bourque del.

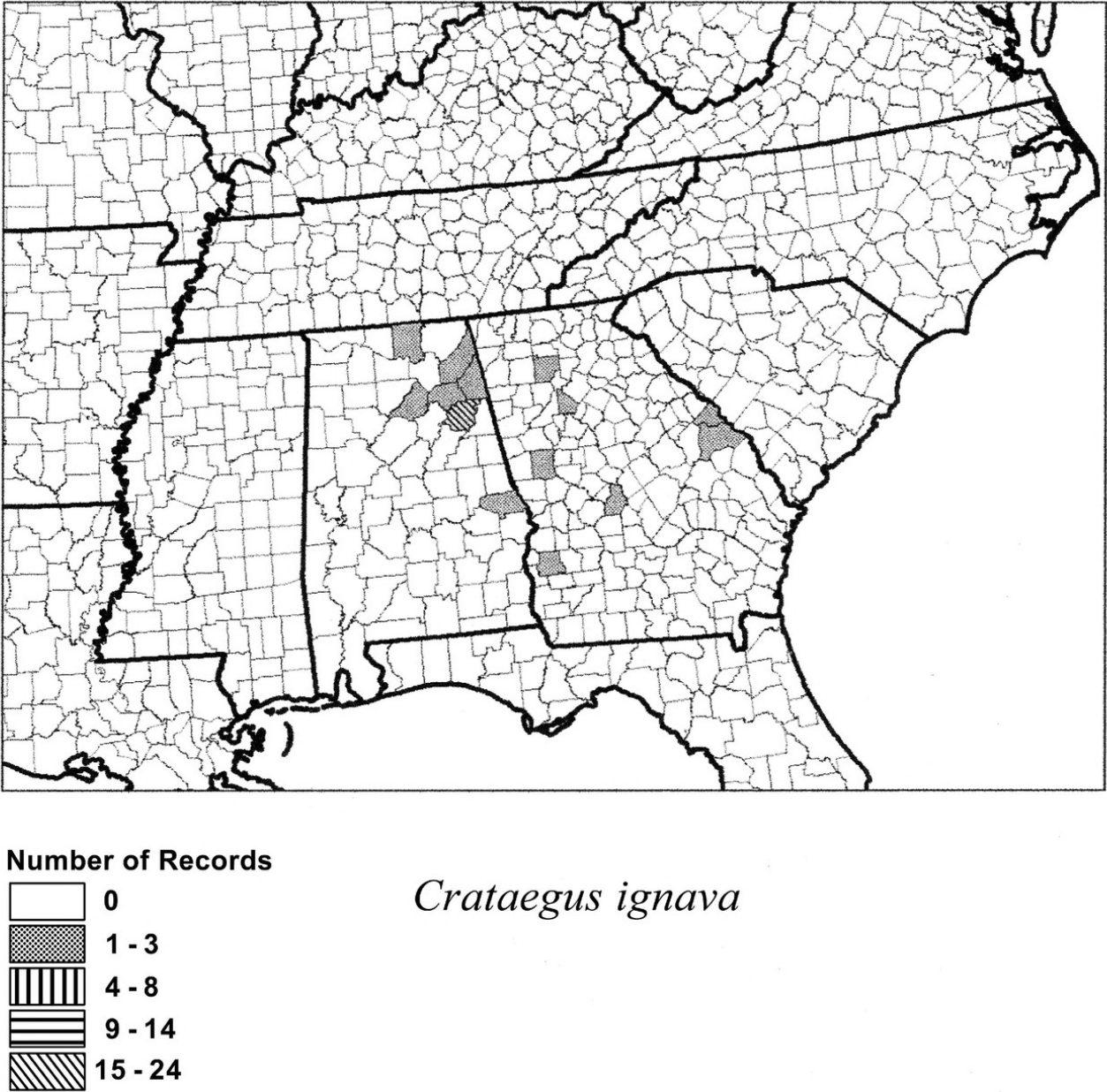


FIG. 14. County level distribution map of *Crataegus ignava*.

very young, soon glabrescent, below glabrous. Inflorescences 2–4 flowered; branches glabrous, bearing early caducous, linear, membranous, gland-margined bracteoles. Flowers 20 mm diam.; hypanthium externally glabrous; calyx lobes 5 mm long, narrowly triangular, abaxially glabrous, margins glandular-serrate; petals ± circular, white; stamens 10, anthers pink; styles ca. 4. Fruit 8–12 mm thick, globose-pyriform, glabrous, red; nutlets 2–5 (Beadle).

Habitat and Distribution.—*Crataegus allegheniensis* is known from a few locations in northeastern Alabama, Tennessee and Georgia and is apparently scarce (Fig. 16). It occurs in various brushy places and in Alabama on rocky hills.

Comment.—This species is superficially similar to *C. frugiferens* and may perhaps turn out to be only a glabrous form of that species.

11. *Crataegus frugiferens* Beadle, Biltmore Bot. Stud. 1:30. 1901. (**Fig. 17**). TYPE: U.S.A. ALABAMA. Cullman Co.: Cullman, 24 Aug 1901, T.G. Harbison 2116 (LECTOTYPE selected here: US).

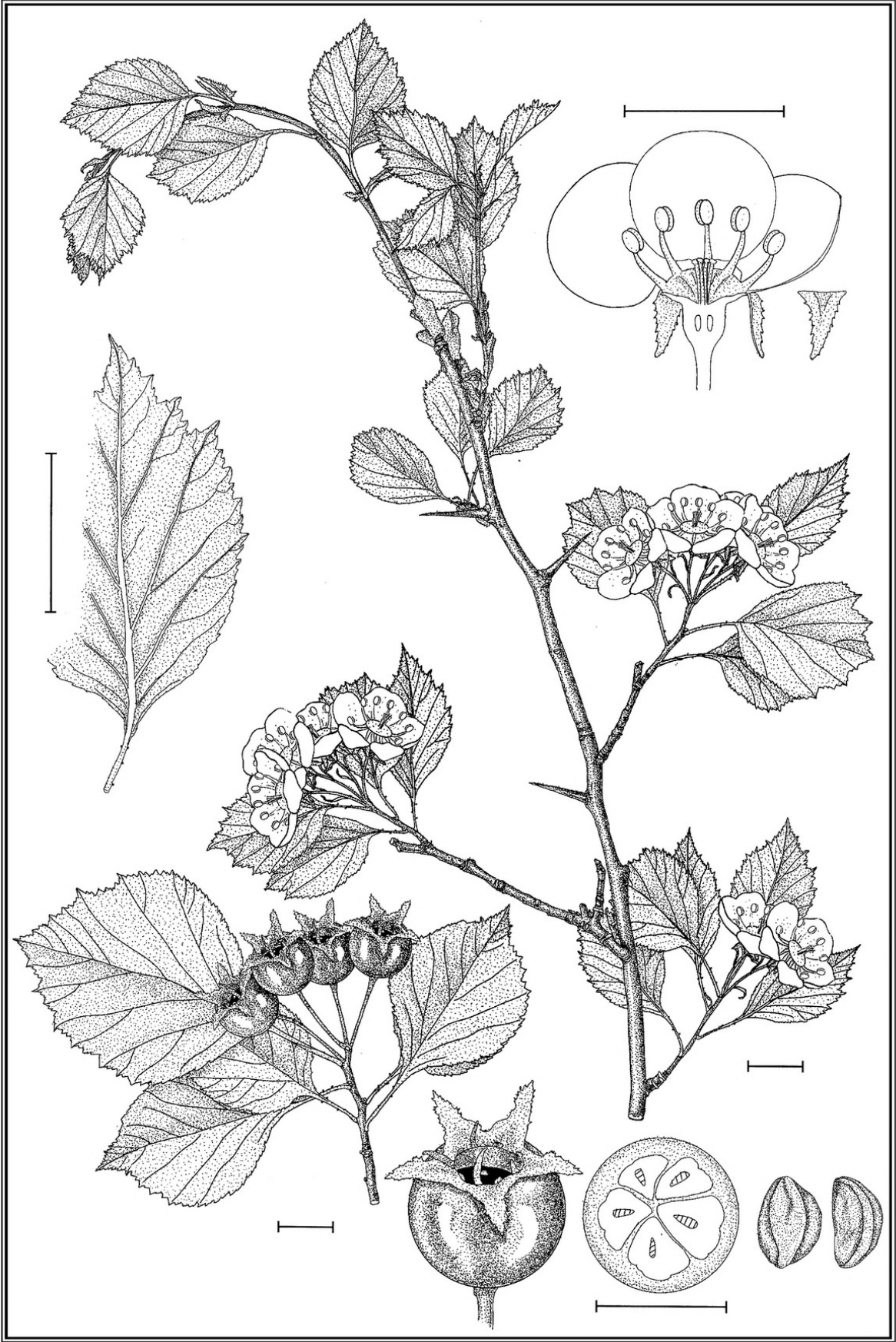


FIG. 15. Line drawing of *Crataegus allegheniensis* from Barber et al. 1546 (UWO), fruiting and Phipps 7655 (UWO) flowering. Scale bars =1 cm. S. Laurie-Bourque del.

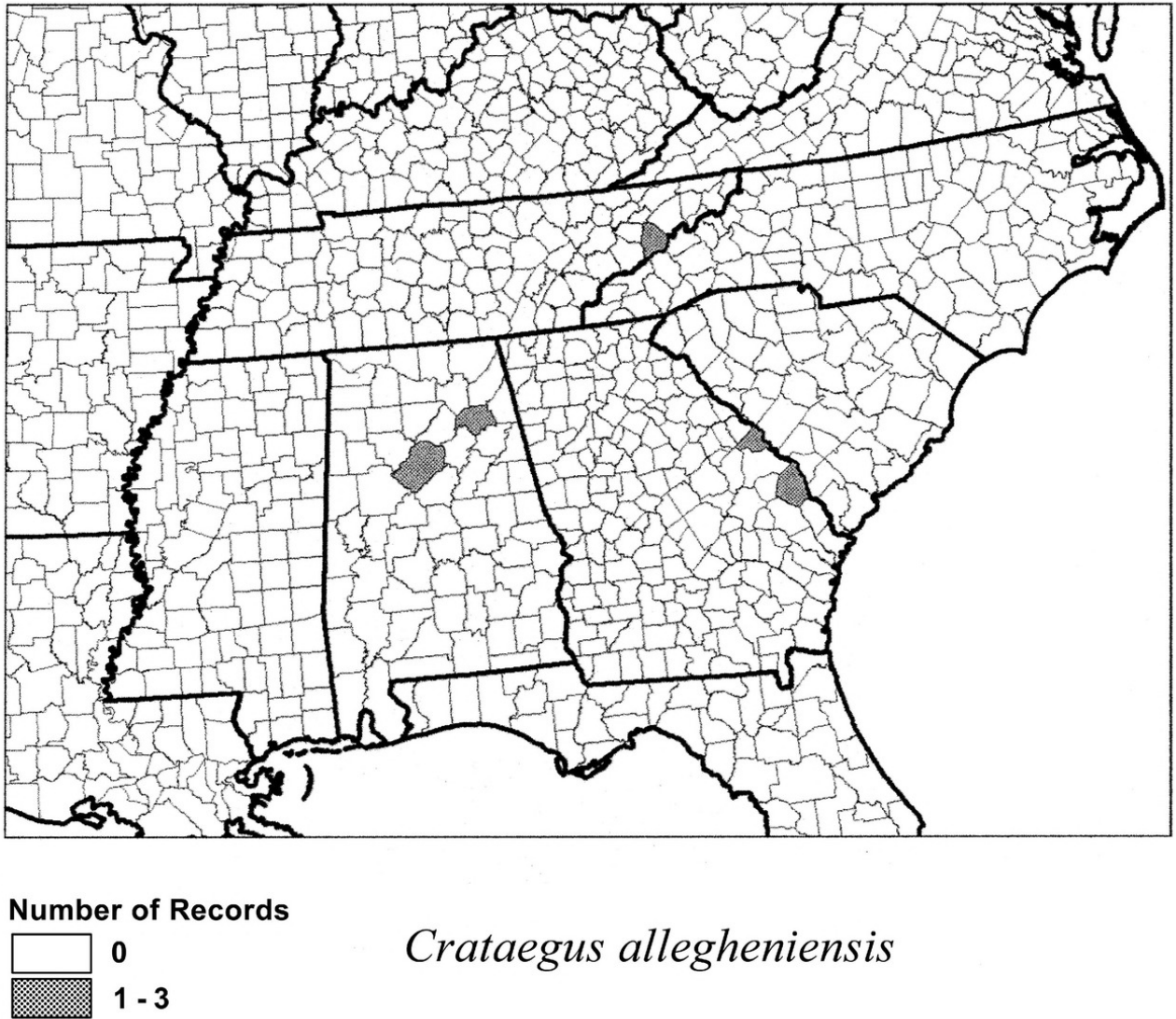


FIG. 16. County level distribution map of *Crataegus allegheniensis*.

Shrubs 3–6 m tall; thorns at 2 yr. 2–5 cm long, \pm fine, straight to slightly recurved shiny dark brown or blackish, older gray; extending shoots \pm appressed pubescent, reddish when young; at 1 yr. \pm shiny tan, older gray. Leaves deciduous; petioles 25–40% length of blades, slender, thinly pubescent, more so in adaxial groove, bearing a few, often stipitate, glands; blades 2.5–5 cm long, ovate to rhombovate, tip acute, base cuneate to broadly cuneate, 0–3 lobed per side; lobes very shallow, sometimes little more than apiculi, max LII 0–5%; margins serrate with gland-tipped teeth basally, these glands sometimes stipitate; venation craspedodromous, 5–6(–7) veins per side; appressed scabrous-pubescent above young, later \pm glabrescent, below glabrous on the surface, thinly scabrous on the veins; thin. Inflorescences 3–7 flowered; branches appressed scabrous-pubescent; bracteoles very few, apparently early caducous, linear, membranous, gland-margined. Flowers 15–16 mm diam.; hypanthium externally appressed scabrous-pubescent at least below; calyx lobes 4–5 mm long, narrow triangular, margins glandular-serrate; petals \pm circular, white; stamens 10 or 20, anthers cream or pink; styles 3–4. Fruit not known to me but according to Beadle 9–12 mm thick, subglobose or slightly pyriform, red at maturity; calyx lobes reflexed, margins glandular-serrate; pyrenes 3–5.

Habitat and Distribution.—The main range of *Crataegus frugiferens* is in north central Alabama and adjacent Georgia. A single record is also known from Mississippi (Fig. 18). It is a somewhat scarce species found both in thick woodland and rocky outcrops.

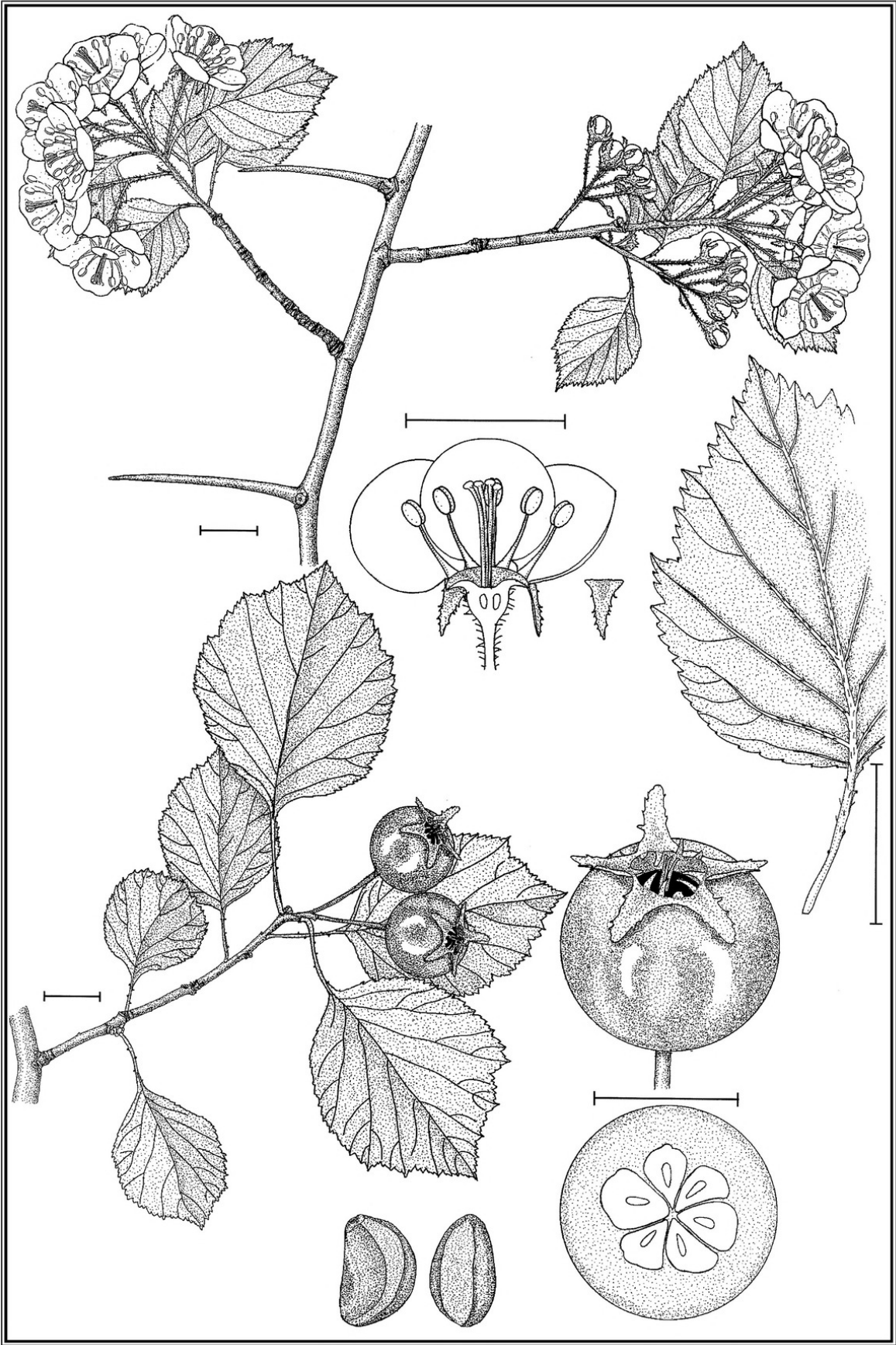


FIG. 17. Line drawing of *Crataegus frugiferens* from Phipps & Wells 5309 (UWO), flowering and Phipps & Spaulding 7771 (UWO), fruiting. Scale bars =1 cm. S. Laurie-Bourque del.

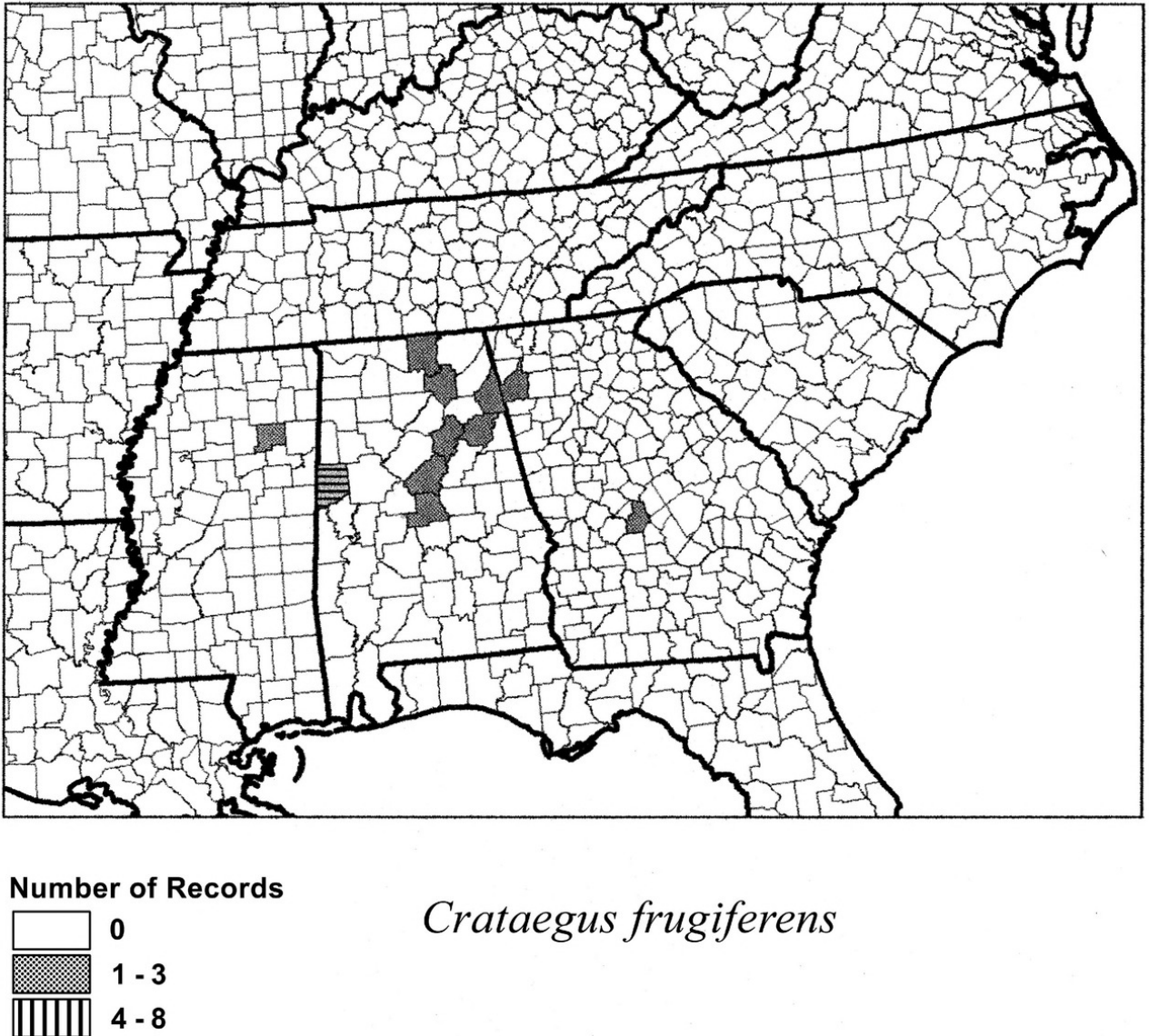


FIG. 18. County level distribution map of *Crataegus frugiferens*.

Comment.—*Crataegus frugiferens* is one of the more distinct species of ser. *Apricae*, even to being superficially similar to *C. collina* from which it differs in its glandular, often stipitately so, petioles and leaf bases as well as leaf shape which is relatively broader with much more wide-cuneate base. It also has more strongly glandular-serrate calyx lobes and usually, deeper red, softer fruit. The leaves at anthesis are no larger than the flowers, as is common in *C. collina*. Its thin leaves make it less xeromorphic than other members of the series. Specimens of this species have been annotated '*C. rigens*'.

12. *Crataegus* cf. *extraria* Beadle, Biltmore Bot. Stud. 1:73. 1902. TYPE: U.S.A. GEORGIA. Cobb Co.: Marietta, 11 Sep 1901, C.D. Beadle 2485² (LECTOTYPE selected here: US).

Shrub, 2.5 m tall; 1 yr. old twigs reddish-brown; older dark purple-brown. Leaves deciduous; petioles 1–1.5 cm long, glandular, thinly hairy; blades 3–4 cm long, rhomb-ovate in general shape; tip acuminate, base cuneate; sides with 2–3 sharp to obscure lobes per side, max. LII 10–15%; margins fine-serrate, teeth gland-tipped; venation craspedodromous with 4–5 main veins per side; at maturity leaves glabrous above, green below, somewhat pubescent on the veins and thinly so on the surface. Inflorescences 3–5 flowered; branches pilose-pubescent, bracteoles not recorded. Flowers 16–20 mm diam.; hypanthium externally

pilose-pubescent; calyx lobes narrow-triangular, margins glandular-serrate; stamens 12–15(–20), anthers dark purple, styles 2–3(–4). Fruit 9–12 mm diam., \pm spherical, glabrous, red but yellow-orange when not fully ripe on pilose pedicels; calyx lobes spreading, elevated on a distinct collar; stamen remnants ca. 20 in specimen studied; nutlets ca. 4.

Habitat and Distribution.—*Crataegus extraria* has always been very rare and occurred in scattered localities in North Carolina and Virginia. Somewhat similar forms (*C. cf. extraria*) were known from Alabama and one such has been found recently, collected in Georgia on 5 Sep 1999 by R. Lance on the Tallulah R. Gorge, Rabun Co. The Alabama specimen reported differs from the type description in possessing 20 stamens.

Comment.—Due to the rarity of *C. extraria* itself, and the very scattered distribution *C. cf. extraria*, plus their collective variability, this entity, which may represent more than one taxon, is neither mapped nor illustrated and perhaps in part constitutes sporadic hybrids between other species.

13. *Crataegus cf. annosa* Beadle

The following entity is known from a number of specimens. It was thought to be *C. annosa* during annotations but it has only apricoid foliage.

Tree, 5–8 m tall; bark of trunk rough and dark; twigs somewhat flexuous at the nodes, at 1 year old dark reddish-brown, older gray; thorns at 1 year 2–3.5 cm long, \pm straight, shiny dark reddish-brown, very slightly recurved. Leaves deciduous; petioles 1.5–2 cm long, slender, pubescent young, thinning older, glandular; blades 3–5 cm long, broadly elliptic to rhombic in general shape; tip subacute to obtuse, base cuneate; sides \pm shallowly but \pm sharply 1–3-lobed, margins shallowly crenate; venation craspedodromous, 4–5 lateral veins per side; thinly hairy above at first, especially along the midvein, becoming glabrous, thinly hairy on the abaxial surface, more densely so on the midvein and main lateral veins, glabrescent. Inflorescences 3–5-flowered; branches pubescent, bearing caducous, linear, membranous, gland-margined bracteoles. Flowers 15–20 mm wide; hypanthium externally thinly pubescent; calyx lobes narrow triangular, margins deeply incised with glandular teeth; petals \pm circular, white; stamens 20, anthers ivory; styles 3–5. Fruit 12–15 mm diam., subglobose, orange-red or red and orange when ripe, glabrous; calyx lobes erose or spreading; nutlets 3–5, dorsally grooved, sides plane.

Habitat and Distribution.—Occurs in Alabama, northern Florida, Georgia and North and South Carolina. This is a rare plant of well-drained soils in woodland.

Comment.—This entity can be somewhat intermediate between *C. ignava* and *C. flava* in leaf shape though in size rather smaller than *C. ignava* but it is a much more hairy plant, has 20 stamens, reddish subglobose fruit and much of the material has quite distinctly rhombic leaves. For similar reasons to *C. extraria*, this taxon is neither mapped nor illustrated.

IMPERFECTLY KNOWN SPECIES

Here follows a number of forms, superficially quite distinctive but only known from a limited amount of material. It seems important to draw attention to these forms but we consider it inappropriate to apply definite names based on the limited knowledge. None of these entities is known today.

1. *Crataegus cf. C. flava* Aiton

“Small tree” in only known indication of habit (on the Harbison specimen); twigs \pm flexuous at the nodes, very dark at two years; thorns 1.5–2.5 cm long, blackish, straight. Leaves deciduous; petioles 25–30% length of blade, glandular; blades 2–4 cm long at full expansion, 1.75–3 cm at anthesis, predominantly obovate to rhombobovate to rhombelliptic; lobes lacking on mature short-shoot leaves, mere notches or with LII to 15%, if latter, obtuse to subacute at maturity but at anthesis lobes may be more prominent and even acute; venation craspedodromous, 2–4 lateral veins per side; margins finely crenate-serrate almost to base; glabrous except for hairs along veins adaxially young. Inflorescences 1–5-flowered; branches thin-pilose, bearing plentiful, narrow, membranous, short-stipitately glandular bracteoles. Flowers 15–18 mm diam.; hypanthium sparsely hairy; calyx lobes somewhat foliaceous, strongly glandular-serrate, nearly glabrous (few short hairs near tip) adaxially; stamens 20, anthers “white”; styles 3–4. Fruit not known.

Habitat and Distribution.—This entity is known only from six flowering specimens from Augusta, Georgia collected at different times from 1900–1919. The Augusta sand hills yielded many interesting hawthorns at the beginning of the last century and similar areas in and around Augusta should be searched assiduously for these and others by those in a position to do so.

Comment.—The leaves are extremely similar in form to those of true *C. flava* but the above plants cannot automatically be placed there on account of a complete absence of fruiting material and the fact that they have 20 stamens and white anthers. Also the twigs are generally more flexuous than in *C. flava*. Similar to the above description but with more ovate leaves and purple anthers are *Harbison* 32 and *Sargent s.n.* (24 Apr 1900)—see cited specimens.

2. *Crataegus calva* Beadle, Biltmore Bot. Stud. 1:83. 1902. TYPE: U.S.A. ALABAMA. Dale Co.: Ozark, 4 Sep 1901, T.G. Harbison 5004 (LECTOTYPE selected here: US).

Shrubs 3–6 m tall; bark of trunk rough; crown irregular-spreading; twigs at 1 yr old slightly flexuous, color not recorded; extending twigs not recorded; thorns 1.5–2 cm long, \pm straight, chestnut-brown in second year. Leaves deciduous; petioles slender below, winged above, unwinged portion ca. 30% length of blade, minutely glandular; blades 1.5–2.5 cm long, (those of extension shoots to 4 cm) broad elliptic to obovate or rhombobovate in general shape, sides tapered into the winged upper part of the petiole; tip \pm subacute (more rarely obtuse or acute); often with 1 subacute lobe per side distally, LII 0–15%; margins crenate except near base; venation craspedodromous, 2–3 lateral veins per side; when young with a few weak hairs on midrib and principal veins below; somewhat coriaceous at maturity. Inflorescences 3–5 flowered; branches glabrous, bearing deciduous, oblong-linear, membranous, gland-bordered bracteoles; flowering early to mid-April. Flowers 16–18 mm wide; hypanthium externally glabrous; calyx lobes 3–4 mm long, narrow-triangular, margins subentire to finely toothed, teeth glandular; petals \pm circular, white; stamens 20, anthers cream or ivory; styles 3–5. Fruit typically 7–10 mm diam., globose, yellow or orange-red; calyx lobes erose or reflexed; nutlets 3–5, dorsally grooved, sides plane.

Habitat and Distribution.—In woods and on ridges, Ozark, Alabama, not certainly known from elsewhere.

3. *Crataegus arrogans* Beadle, Biltmore Bot. Stud. 1:81. 1902. TYPE: U.S.A. ALABAMA. Russell Co.: Phenix City, 26 Aug 1901, C.D. Beadle 4869 (LECTOTYPE selected here: US).

Tree, 4–5 m tall; bark 'rough', dark; thorns 1.5–2 cm long, straight to slightly recurved, \pm stout; twigs flexuous. Leaves deciduous; petioles 25% length of blade, glandular leaf blades 1.5–2 cm long, elliptic, pointed at both ends; suggestions of pointed apiculi on some; veins 3–4/side; margins weakly and finely crenate distally, teeth sometimes glandular; glabrous at maturity. Inflorescences few flowered; branches pubescent. Flowers, diam. not recorded; hypanthium pubescent; sepals short, triangular, margins glandular-serrate; stamens 20, anthers bright purple; styles 3–4. Fruit 9–12 mm diam., pyriform, red at maturity.

Habitat and Distribution.—Only known with certainty from the type locality.

Comment.—This is undoubtedly ser. *Apricae*, probably the *visenda* group.

4. *Crataegus extraria* Beadle Biltmore Bot. Stud. 1:73. 1902. TYPE: U.S.A. GEORGIA. Cobb Co.: Marietta, 11 Sep 1901, C.D. Beadle 4285² (LECTOTYPE selected here: US). Regrettably the lectotype is a very poor specimen, having lost most of its foliage.

Large shrub, 2–4 m tall; trunk bark rough or scaly, dark gray or brownish; twigs somewhat flexuous; thorns 2.5–4 cm long, slender, slightly recurved. Leaves deciduous; petioles 25–40% length of blade, winged above; blades 2–3.5 cm long (few seen) broad rhombic to broad rhombovate in general shape; conspicuously though shallowly acute lobed across distal end; margins with conspicuous sharp teeth; venation craspedodromous, 3–4?-veined per side; glabrous; leaves on extension shoots much larger, often ovate, sharply 3–4-lobed per side. Inflorescences 3–5-flowered; branches pilose-pubescent; bracteoles not recorded. Flower diam. not recorded; hypanthium pilose-pubescent; sepals 4–5 mm long, margins glandular-serrate; stamens 12–15, anthers pale purple; styles 2–3. Fruit 9–12 mm diam., subglobose to ellipsoid, red at maturity, nutlets 2–3.

Habitat and Distribution.—Only known with certainty from the type locality.

Comment.—Provisionally this should be assigned to ser. *Apricae* though not enough is known about its glandularity.

DOUBTFUL SPECIES

SERIES *APRICA*E OR *LACRIMATA*E

Crataegus annosa Beadle, Biltmore Bot. Stud. 1:83. 1902. TYPE: U.S.A. ALABAMA. Russell Co.: Phenix City, without date, C.D. Beadle 4103 (LECTOTYPE selected here: US; ISOLECTOTYPE: A). The lectotype is a fruiting specimen and isolectotype, C.D. Beadle 4103², with the same label data, is a flowering specimen.

Tree sometimes 8 m tall; bark of trunk rimose, dark; thorns on twigs 2–3 cm long, chestnut-brown or gray. Leaves deciduous; petioles 5–20 mm long, slender, glandular, pubescent at least young; blades 2–4 cm long, (rhomb-elliptic to obovate or obtrullate with small lobes across the apical part); venation craspedodromous, 2–3 lateral veins per side (on extension shoots 3–4 pairs); thinly hairy. Inflorescences 3–5 flowered; branches densely pubescent. Flowers 15–20 mm diam.; hypanthium pubescent; sepals 3–4.5 mm long, margins glandular-serrate; stamens 20, ivory anthers; styles 3–5. Fruit 10–12 mm diam., reddish-orange to yellow, washed red; sepals reflexed; nutlets 3–5, plane-sided, grooved dorsally.

Habitat and Distribution.—Known with certainty only from the type, more material is needed to come to any definite conclusions.

Comment.—In foliage and fruit, except for the narrower leaves, *C. annosa* is of typical form for ser. *Apricae*, but in anther number and color and the form of the narrower leaf set among the short-shoot leaves it is a typical member of ser. *Lacrimatae*.

EXCLUDED SPECIES

SERIES *INTRICATA*E

Crataegus flava Aiton, Hortus Kewensis 1:169. 1789. TYPE: U.K: Kew, cultivated, 1781, *Herb. Bishop Goodenough* (HOLOTYPE: K). See Phipps 1988a for a line drawing, photograph of type, and distribution map.

Shrubs or small trees, 5–6 m. tall; branchlets ± straight; extending twigs glabrous; 1-year old twigs glabrous (? always), purple-brown; older dark gray; 2-year old thorns 2–3 cm long, slender, purple-brown, straight to slightly recurved. Leaves deciduous; petioles 0.75–1.5 cm long, slightly pubescent, winged above, conspicuously black-glandular, the glands usually sessile, sometimes short-stipitate; blades 5–8 cm long in UK-cultivated material, rhomb-obovate in general outline, shallowly 1–3 lobed per side, lobes obtuse to acute, at the apex subacute to obtuse, at the base cuneate, and tapered into the winged upper part of the petiole; margins crenate to crenate-dentate, the teeth gland-tipped; venation craspedodromous, 3–4 pairs of lateral veins; pubescent above when young, glabrescent. Inflorescences 4–6 flowered; branches slightly villous or glabrous, bearing caducous, linear, membranous, gland-margined bracteoles; anthesis early April. Flowers 16–18 mm diam.; hypanthium externally glabrous; calyx lobes 4–5 mm long, narrow triangular, gland-margined; petals ± circular, white; stamens 10, anthers purple; styles 3–5. Fruit 8–12 mm diam., ± pyriform-oblong, dull orange; calyx lobes ± reflexed, slightly elevated on a collar; nutlets 3–5, dorsally sulcate, laterally smooth.

Common Name.—Yellow hawthorn.

Habitat and Distribution.—This is a rare species of the southeast United States from southeastern Georgia to South Carolina and northern Florida with one record from Alabama and another from North Carolina. There are also possible records for Virginia. It is usually found in deep sandy soils.

Comment.—Long known in cultivation in England where it was described by William Aiton at Kew. Unfortunately the name *C. flava* got transferred to *C. lacrimata* Small or a similar species due to an error by Sargent (1902) that has been perpetuated by many workers on the flora of the southeastern United States. Sargent's (1890) treatment of this species is, however, nearer the mark in leaf shape although typical material is glabrous to nearly so in the inflorescence. Aiton's original interpretation was eventually resuscitated by the first author (Phipps 1988a). The true *C. flava* differs in significant ways from other species of series *Flavae*, sens. auctt. Amer. (= ser. *Lacrimatae* + ser. *Apricae*) as is discussed in the treatment for ser. *Apricae*. In its new series (ser. *Intricatae*) *C. flava* shows most similarity to *C. rubella* in fruit shape and color as well as general glandularity. It is no longer recorded in cultivation.

No recent collections match typical *C. flava* though several from central and southern Georgia have the foliage characters of *C. flava* but possess a more globose fruit and ca. 20 stamens on which basis they would key to an unknown form of ser. *Pulcherrimae* not referred to in Phipps and Dvorsky (2006). The unique leaf shape is substantially the same as in *C. sp. cf. C. flava* from the Augusta sand hills, discussed above, but the forms currently alluded to have straight twigs. Much more material is needed to sort out this assemblage of forms.

APPENDIX

Further cited specimens (species, states, and counties arranged alphabetically).

***Crataegus alleghaniensis* Beadle**

ALABAMA. Etowah Co.: Hind's Rock, near Noccalua Falls, 8 Apr 1998, *J.B. Phipps 7655* (UWO). **Jefferson Co.:** along AL 150 ca. 0.5 mi S of junction with Co. Rd. 972, *J.P. Barber, M.G. Bussey, R.D. Whetstone & K.E. Landers 1546* (JSU, UWO). **GEORGIA. Richmond Co.:** Augusta, 15 Apr 1902, *A. Cuthbert s.n.* (FLAS); Augusta, 27 Apr 1903, *A. Cuthbert s.n.* (FLAS). **Screven Co.:** Blue Springs, 25 Apr 1966, *R.L. Park s.n.* (NCU). **TENNESSEE: Cocke Co.:** within 3 mi of Wolf Creek Station, along the French Road, 24 Aug 1897, *Thos. H. Kearney, Jr. 697* (UWO photo of US 313179).

***Crataegus annosa* Beadle**

ALABAMA. Russell Co.: Phenix City, 1901, *Biltmore Herb. 4103*² (A); Phenix City, 26 Aug 1901, *C.D. Beadle 4108*² (A).

***Crataegus* sp. cf. *C. annosa* Beadle**

FLORIDA. Liberty Co.: Torreya State Park, 21 Oct 1950, *H. Kurz s.n.* (FSU); Torreya State Park, 24 Mar 1951, *H. Kurz s.n.* (FSU). **Wakulla Co.:** on US 98, jct. FLA 365, 11 Apr 1966, *Beckner and D'Arcy 932* (LAF, FLAS). **NORTH CAROLINA. Durham Co.:** 9 May 1901, *W.W. Ashe 1949* (CM). **SOUTH CAROLINA. Aiken Co.:** SC 4, 7 km E of 394, 11 Aug 1993, *J.B. Phipps 6676* (UWO). **Camden Co.:** 27 Mar 1923, *T.G. Harbison 6052* (A). **Chesterfield Co.:** 6 Jun 1976, *J. Castrale 184* (USCH); Haw Ridge, 3 Apr 1935, *V. Matthews and B.E. Smith 218* (USCH).

***Crataegus aprica* Beadle**

ALABAMA. Barbour Co.: Hwy. 55 300 m E of Mt. Olive, 8 Jun 1992, *D.J. Drennen and J. Daniel 00039* (UWO). **FLORIDA. Alachua Co.:** 15 Jun 1940, *W.A. Murrill s.n.* (GA). **Gadsden Co.:** Aspalaga, May, *J.K. Small 297c* (NY); Aspalaga, 1898, *no collector s.n.* (MO); Quincy (14 mi W of), 6 Sep 1940, *W.B. Tisdale and W. A. Murrill s.n.* (FLAS); Chattahoochee, 15 Apr 2006, *J.B. Phipps & R. Lance 9079* (UWO). **GEORGIA. Burke Co.:** Rte 56, N of intersection with 80, N of Lake Crystal Rd. to E, 9 Apr 1991, *J.B. Phipps 6497* (UWO). **Houghton Co.:** Oaky Woods WMA, 14 Apr 2006, *J.B. Phipps & R. Lance 9061* (UWO). **Paulding Co.:** 3/4 mi W of Dallas, 1 Aug 1948, *W.H. Duncan 8643* (MO). **Randolph Co.:** SE of Coleman, 9 Apr 2001, *R. Lance, 2107* (UWO). **Richmond Co.:** Augusta, no date, *S.F. Olney and J. Metcalf s.n.* (NY); Columbia, 19 May 1934, *E.J. Palmer 42408* (NY); Augusta, 11 Apr 1916, *W.W. Ashe 26* (NCU). **NORTH CAROLINA. Buncombe Co.:** (60) E of Asheville, Swannanoa River, 28 Sep 1888, *W.M. Canby s.n.* (NY); Biltmore, 20 Sep 1902, *Biltmore Herb. C.* (NY); near Asheville, 18 Apr 1929, *E.J. Palmer 35436* (NY, A); Biltmore, alt. 2000-2500 ft, 15-19 Sep 1908, *W.W. Eggleston 4125* (NY); Biltmore, 12-15 May 1897, *Biltmore Herb. 297b* (NY); Biltmore, 7 May 1899, *W.M. Canby 34* (DOV); Biltmore, 11 May 1899, *Biltmore Herb. s.n.* (NY); Biltmore, 7 Sep 1899, *Biltmore Herb. s.n.* (NY); Biltmore, 17 Sep 1897, *Biltmore Herb. 297b* (NY); Biltmore, 8 May 1896, *W.W. Eggleston 297* (NY); Biltmore, 12 Aug 1896, *W.W. Eggleston 297* (NY); Biltmore, 20 Sep 1902, *C.D. Beadle C* (NY); Hwy. 191 0.6 mi S of junction with Blue Ridge Pwy., Oct 1993, *R. Lance 93.17* (UWO); Biltmore, 15 Sep 1908, *W.W. Eggleston 4125* (NY); Biltmore, 12 May 1897, *C.D. Beadle 297b* (NY); Biltmore Estate, by riverside on steep cliff, 7 Sep 1984, *P.F. Ulf-Hansen PF119* (UWO); Asheville, 15 Sep 1908, *W.W. Eggleston 4125* (NY); E of Asheville, 28 Sep 1888, *Wm. Canby s.n.* (NY); Biltmore, 8 May 1896, *C.D. Beadle 297* (NY, NCC); Biltmore, 15 May 1902, *C.D. Beadle C* (NY); near Asheville, 18 Apr 1929, *E.J. Palmer 35436* (A, MO); Biltmore Estate, 15 May 1902, *C.D. Beadle 2335* (CM); Biltmore, 7 May 1899, *C.S. Sargent s.n.* (A); Biltmore, 23 Apr 1933, *T.G. Harbison & Totten s.n.* (NCU); Asheville, 15 Aug 1909, *W.W. Eggleston 4425* (MO); Biltmore, 11 May 1899, *C.D. Beadle C14* (GH, NY); near Biltmore, 11 May 1899, *C.D. Beadle C13* (A); Asheville, 26 Oct 1898, *C.S. Sargent s.n.* (A); Biltmore, 28 Sep 1917, *C.D. Beadle s.n.* (A); Biltmore, 7 Sep 1899, *C.D. Beadle C500* (A, NY); Biltmore, 15 Sep 1908, *W.W. Eggleston 4125* (UWO); Biltmore, 11 Sep 1899, *C.D. Beadle C500=C14* (GH); Biltmore, 15 May 1897, *Biltmore Herb. 297b* (GH, MO); Biltmore, 24 Jul 1891, *Biltmore Herb. C42* (A); along Hwy 191, 0.6 mi S of junction with Blue Ridge Parkway, S end of "Sandy Bottoms" picnic area, Oct 1993, *R. Lance RO-93.17* (UWO); 19 Sep 1908, *W.W. Eggleston 4125* (BH, CM, GH); Sep 1926, *W.W. Ashe s.n.* (NCU); 10 Oct 1905, *T.G. Harbison 12* (A); no date, *Biltmore Herb. 318* (A); 8 May 1896, *Biltmore Herb. 297* (DOV, NCC); 15 May 1902, *Biltmore Herb. 2027* (DOV). **Cumberland Co.:** Fayetteville, 12 Oct 1908, *W.W. Eggleston 4017a* (NY); Fayetteville, 31 Oct 1908, *W.W. Eggleston 4016* (NY). **Henderson Co.:** 3.5 mi SE of Hendersonville, 17 May 1942, *F.R. Fosberg 18791* (NUC); Hendersonville, no date, *H.L.B. 8819* (DUKE); Flat Rock, 9 Sep 1899, *no collector, s.n.* (NCU). **Wake Co.:** William B Umstead State Park, 22 Aug 1964, *G. Sawyer & W. Ahles 1539* (USCH). **Unknown Co.:** 31 May 1907, *W.W. Ashe 1949* (CM); Western North Carolina, 20 Aug 1901, *W.W. Ashe 1949* (CM); Western North Carolina, 31 May 1907, *W.W. Ashe 1949* (CM); 7 Jun 1900, *A.R. s.n.* (MO). **SOUTH CAROLINA. Aiken Co.:** 12-15 Sep 1909, *W.W. Eggleston 5031* (MO). **Chesterfield Co.:** On Haw Ridge, 23 Apr 1933, *T.G. Harbison s.n.* (NCU). **Darlington Co.:** Hartsville, Swift Creek, 5 May 1941, *E.B. Smith 949* (USCH); 6.5 mi S of Patrick on SC 102, 18 Jul 1958, *J.A. Duke 1556* (NUC).

Greenville Co.: lower slopes of Caesar's Head Mt., 20 Sep 1934, *E.T. Wherry s.n.* (A); Caesar's Head Mt., 20 Sep 1934, *E.T. Wherry s.n.* (A). **Kershaw Co.:** Middleton, 2 mi S of Camden Junction, 20 Apr 1897, *L.F. Ward s.n.* (NY). **Richland Co.:** near Columbia; woods, 19 May 1934, *E.J. Palmer 42408* (A, NY, SC). **TENNESSEE: Union Co.:** Area 24 Pill, Walkers Pond Refuge, 17 Jul 1936, **L.B. Kalter 361** (TENN). **VIRGINIA: Franklin Co.:** Franklin, 27 Aug 1909, *W.W. Eggleston 4925* (NY). **Southampton Co.:** 29 Jun 1893, *A. Heller s.n.* (GH, MO); 29 Jun 1893, *A. Heller 20a* (A).

Crataegus egregia Beadle

ALABAMA. Macon Co.: Tuskegee National Forest, 2 Apr 1967, *T. Rankin 21* (NCU). **FLORIDA. Clay Co.:** Magnolia Springs, 23 Sep 1923, *T.G. Harbison 5664* (A). **Liberty Co.:** Bristol, 24 Aug 1908, *Biltmore Herb. No. 4924* (A); Bristol, 31 Mar 1907, *Biltmore Herb. No. 4924* (A). **Wakulla Co.:** S of Wakulla Springs, 21 Aug 1951, *H. Kurz s.n.* (FSU). **GEORGIA. Richmond Co.:** Augusta, sandhills, 9 Sep 1902, *A. Cuthbert s.n.* (FLAS). **SOUTH CAROLINA. Aiken Co.:** no location, 20 Jun 1952, *W.R. Kelley & W.T. Batson s.n.* (USCH); no location, 14 Jul 1952, *W.R. Kelley & W.T. Batson s.n.* (USCH). **Barnwell Co.:** Barnwell State Park, 27 Aug 1956, *C.L. Porter 342* (USCH); no location, no date, *W.R. Kelley & W.T. Batson s.n.* (USCH).

Crataegus extraria Beadle and **C. cf. extraria** Beadle

ALABAMA. Lee Co.: Auburn, 18 Apr 1896, *Earle and Underwood* (NY); Auburn, 18 Apr 1894, *C. Mohr* (CM). **GEORGIA. Lumpkin Co.:** Porter Springs, *W.W. Ashe* (NCU). **NORTH CAROLINA. Cumberland Co.:** Fayetteville, 26–31 Aug 1908, *W.W. Eggleston 4019* (NY); Fayetteville, 16 Apr 1903, *Biltmore Herb. B8066–B7272* (NY); Fayetteville, 17 Oct 1902, *Biltmore Herb. B7272* (NY); Fayetteville, 17 Oct 1902, *Biltmore Herb. 7272* (NY); Fayetteville, 16 Apr 1903, *Biltmore Herb. 8006* (NY). **Richmond Co.:** Washington Rd., N of Augusta, GA, 14 Oct 1916, *W.W. Ashe* (NCU). **VIRGINIA. Wight Co.:** S of Zuni, 17 Oct 1936, *M.L. Fernald & B. Long 6818* (NY).

Crataegus frugiferens Beadle

ALABAMA. Calhoun Co.: Fort McClellan Military Reservation, 8 Apr 1998, *J.B. Phipps 7645* (UWO); Anniston, Natural History Museum grounds, 30 Sep 1998, *J.B. Phipps & D. Spaulding 7771* (UWO); Coldwater Mountain, woodland border next logging road, 20 Apr 1999, *D. Spaulding 10606* (UWO). **Cherokee Co.:** Cherokee 19, 1 mi N of 278, 8 Oct 1998, *J.B. Phipps 7834* (UWO). **Chilton Co.:** Bluffs above quarry at Coosa River, 4 Oct 2000, *J.B. Phipps 7669* (UWO); Bluffs above quarry at Coosa River, 4 Oct 2000, *J.B. Phipps 7670* (UWO). **Madison Co.:** Deer Haven Rd., NE of Huntsville, 25 Apr 1983, *P.F. Ulf-Hansen 034* (UWO). **Marshall Co.:** Lake Guntersville State Park, Cutchenmire Trail near Berry Point, 21 Apr 1999, *J.B. Phipps, R.J. O'Kennon & D. Spaulding 7968* (UWO). **Pickens Co.:** 8.3 mi E of Ethelsville, 5 Apr 1968, *S. McDaniel 10447* (ALU, FSU, IBE, LAF, NO). **Shelby Co.:** near Pelham, AL 33, approx 0.75 km N of Co. Rd. 52, 5 Apr 1984, *J.B. Phipps & T.C. Wells 5309* (UWO); near Pelham, E side of AL 33, approx 0.75 km N of Co. Rd. 52, 5 Apr 1984, *J.B. Phipps & T.C. Wells 5310* (UWO). **St. Clair Co.:** Pottsville, 4 Jun 1963, *P.E. Bostick s.n.* (NCU). **GEORGIA. Floyd Co.:** McGee Bend Rd., off GA 100 (WSW of Rome), 4 Apr 2000, *J.B. Phipps 8207* (UWO). **Houston Co.:** Oaky Woods WMA, Green Violet Prairie, 14 Apr 2006, *J.B. Phipps & R. Lance 9067* (UWO). **MISSISSIPPI: Chickasaw Co.:** MS 41 to SE of Natchez Trace Parkway, 13 Apr 1998, *J.B. Phipps 7714* (UWO).

Crataegus galbana Beadle

ALABAMA. Conecuh Co.: Hwy. 29 at Sepulga River, 17 Aug 1985, *A.R. Diamond 1529* (AUA). **Geneva Co.:** 7.5 mi S of Samson, 7 Jun 1969, *R. Kral 35109* (AUB); near Smith Lake, 12 Sep 1967, *J. Thomas 1218* (ALU). **Greene Co.:** near Smith Lake, 12 Sep 1967, *J.L. Thomas 1218* (ALU). **Lee Co.:** Auburn, 10 Oct 1900, *F.S. & E. Earle 23* (GH). **FLORIDA. Alachua Co.:** 30 Jun 1927, *Manning and Wiegand 1386* (GH); Nr. Gainesville, 14 Apr 1941, *W.A. Murrill s.n.* (GA); NW of Gainesville, 10 Sep 1940, *W.A. Murrill s.n.* (A). **Columbia Co.:** Camp Oleno, 8 Sep 1940, *W.A. Murrill s.n.* (GA). **Gadsden Co.:** 8 mi SW of Chattahoochee, 20 Aug 1966, *D.B. Ward 5918* (FLAS); 1 mi S of River Junction, 6 Sep 1940, *W.B. Tisdale & W.A. Murrill s.n.* (FLAS). **Holmes Co.:** 1 mi N of Westville, 17 Mar 1982, *R.K. Godfrey 79427* (FSU, IBE); Nr. Westville, 31 Mar 1940, *M.G. Henry 1993* (GA). **Jackson Co.:** 2 mi E of Grand Ridge, 27 Mar 1964, *S. McDaniel 4011* (IBE, FSU); 2 mi E of Grand Ridge, 27 Mar 1964, *S. McDaniel 4011* (IBE). **Jefferson Co.:** No locality, 10 Jul 1940, *W.A. Murrill s.n.* (FLAS). **Lafayette Co.:** 4 mi W of Mayo, 21 Aug 1939, *W.A. Murrill and W.B. Tisdale s.n.* (A). **Leon Co.:** Tallahassee, 3 Apr 1901, *Biltmore Herb. 4052* (GH); Tallahassee, 29 Aug 1901, *Biltmore Herb. 4948* (GH); Tallahassee Junior Museum, SW of Tallahassee, 17 Aug 1982, *R.K. Godfrey 79926* (FSU, UWO); Tallahassee, Apr 1893, *C.S. Sargent s.n.* (MO). **Madison Co.:** 3 mi NNE Pinetta, 2 Sep 1968, *R.A. Norris 1086* (IBE); Lee (2.5 mi E of), 22 Aug 1940, *W.A. Murrill s.n.* (FLAS). **Suwanee Co.:** O'Brien (5 mi W of), 9 Aug 1946, *West and Arnold s.n.* (FLAS). **Wakulla Co.:** US 98, W of jct. FL 365, 11 Apr 1966, *J. Beckner s.n.* (LAF). **GEORGIA. Burke Co.:** On Savannah River, 20 Jun 1941, *W.M. Duncan 3385* (GA). **Chattooga Co.:** Summerville, no date, *Biltmore Herb. 6113* (NY). **Floyd Co.:** no location, no date, *A.W. Chapman s.n.* (AUB); Rome, 22 Apr 1900, *C.S. Sargent s.n.* (GH). **Richmond Co.:** Augusta, Sand Bar Ferry, 14 Aug 1902, *A. Cuthbert s.n.* (FLAS). **NORTH CAROLINA. Harnett Co.:** 2 mi W of Spout Springs, 29 Sep 1970, *R.M. Downs 11614* (NCSC). **Johnston Co.:** Selma, 9 Apr 1912, *T.G. Harbison 10834* (NCU). **SOUTH CAROLINA. Kershaw Co.:** 6 mi E of Camden, 17 Jun 1933, *T.G. Harbison & H.R. Totten 4052* (NCU). **McCormick Co.:** Clark Hill Dam, 5 Nov 1900, *C. McComb 97* (GA).

Crataegus ignava Beadle

ALABAMA. Blount Co.: Ridge of Blount Mtn., 25 Apr 1983, *P.F. Ulf-Hansen 31* (UWO). **E of Highland Lake on ridge of Blount Mtn.,** 25 Apr 1983, *P.F. Ulf-Hansen 33* (UWO). **Calhoun Co.:** Fort McClellan Military Reservation, near Anniston, 30 Sep 1998, *J.B. Phipps & R. Smith 7773* (UWO); Fort McClellan Military Reservation, near Anniston, 8 Apr 1998, *J.B. Phipps 7642* (UWO); Fort McClellan Military Reservation, near Anniston, 2 Jul 1998, *R. Smith & D. Spaulding A, B, C* (UWO, 3); Fort McClellan Military Res-

ervation, near Anniston, 22 Apr 1998, *R. Smith & D. Spaulding* 4 (UWO); Logging Road on Coldwater Mountain, 20 Apr 1999, *D. Spaulding* 10605 (UWO). **Cherokee Co.:** AL 9, N of Piedmont, 19 Apr 1999, *J.B. Phipps & R. J. O'Kennon* 7947 (UWO). **Etowah Co.:** Hind's Rock, near Noccalua Falls, 8 Apr 1998, *J.B. Phipps* 7655 (UWO). **Jefferson Co.:** along AL 150 ca. ½ mi S of jct. with Co. Rd. 97 and 2, 23 May 1985, *J.P. Barber, M.G. Bussey, R.D. Whetstone and K.E. Landers* 1546 (JSU, UWO). **FLORIDA. Gadsden Co.:** S of Chattahoochee, 15 Apr 2006, *J.B. Phipps, R. Lance & A. Gholson* 9090 (UWO). **GEORGIA. Burke Co.:** NE of Waynesboro, s of McBean 11 Apr 2006, *J.B. Phipps* 9040 (UWO). **Screven Co.:** Blue Springs, 25 Apr 1966, *R.L. Park s.n.* (NCU). Randolph Co.: Few mi W of Cuthbert, 29 Mar 1948, *R.F. Thorne & W.C. Muenscher* 7748 (UWO, photo). **Richmond Co.:** Augusta, 15 Apr 1902; *A. Cuthbert s.n.* (FLAS); Augusta, 23 Apr 1903; *A. Cuthbert s.n.* (FLAS). **TENNESSEE: Cocke Co.:** within 3 mi of Wolf Creek Station, along the French Road, 24 Aug 1897, *Thos. H. Kearney Jr.* 697 (UWO).

Crataegus leonensis E.J. Palmer

FLORIDA. Gadsden Co.: Chattahoochee, May 1899, *Wm Canby & C.S. Sargent* 27 (DOV). **Leon Co.:** Tallahassee, Horseshoe Plantation, 28 Mar 1914, *C.S. Sargent s.n.* (A); Tallahassee, Horseshoe Plantation, 16 Sep 1919, *T.G. Harbison* 2 (A); Tallahassee, Horseshoe Plantation, 6 Apr 1920, *T.G. Harbison* 5645, 5646 (A,2); Tallahassee, Horseshoe Plantation, Oct 6 1920, *T.G. Harbison* 5648 (A); Tallahassee, Horseshoe Plantation, 3 Apr 1923, *T.G. Harbison* 6071 (A); Tallahassee, Horseshoe Plantation, 27 Sep 1923, *T.G. Harbison* 6182, 6183 (A, 2); Tallahassee, Horseshoe Plantation, 12 Apr 1931 *E.J. Palmer* 38557 (A); Lake Lamonia, 15 Mar 1951, *E.J. Palmer s.n.* (FSU). **GEORGIA. Decatur Co.:** 7 mi S of Bainbridge, 1 Apr 1970, *R.K. Godfrey* 69336 (FSU).

Crataegus mira Beadle

ALABAMA. Cleburne Co.: Talladega Nat. Forest, 5 mi S of Fruithurst, F.S. Road 2700, 18 Jun 1966, *T.A. Heard & R.C. Clarke* 2767 (NCU). **Franklin Co.:** no locality, 21 Apr 1968, *J.G. South s.n.* (JSU). **FLORIDA. Alachua Co.:** W of Gainesville, 1 Aug 1940, *W.A. Murrill s.n.* (GA). **Columbia Co.:** 2 mi from main road towards Camp Oleno, 30 Jun 1940, *W.A. Murrill s.n.* (FLAS); By rock at Camp Oleno, 13 Apr 1941, *W.A. Murrill s.n.* (FLAS). **Gadsden Co.:** Aspalaga, May, no day, no year, *A.W. Chapman* 297c (NY); Aspalaga, 1898, *A.W. Chapman* 2799 (MO); 6 mi S of Quincy on the Blountstown Rd., 12 Sep 1928, *W.W. Ashe s.n.* (NCU). **Leon Co.:** Tallahassee, by US 319 near Neesmith's Nursery, 11 Apr 1983, *R.K. Godfrey* 80460 (FSU, UWO - 5); W of Tallahassee, 1 mi E of Ochlockonee R., 17 Mar 1982, *R.K. Godfrey* 78429 (FSU); Tallahassee, by US 319, near Neesmith's Nursery, 20 Jun 1983, *R.K. Godfrey* 80732 (UWO). **Liberty Co.:** Torreya State Park, 30 Mar. 1975, *R.K. Godfrey* 74198 (FSU, FLAS). **Suwannee Co.:** 1mi S of O'Brien, 22 Aug 1940, *W.A. Murrill s.n.* (FLAS). **GEORGIA. Burke Co.:** Rte. 56, 13 Apr 1993, *J.B. Phipps* 6709 (UWO). **Floyd Co.:** Radio Springs Road, near metal shack, 24 Apr 1983, *P.F. Ulf-Hansen s.n.* (UWO). **Dodge Co.:** E side of Ocmulgee River, 6 Jul 1966, *J.R. Bozeman* 5508 (NCC). **Pulaski Co.:** Jct. Wimberly Rd. and US 341, 10 Apr 2001, *R. Lance* 2123 (UWO). **Paulding Co.:** 10 mi SW of Dallas, 1 Aug 1948, *W.H. Duncan* 8643 (GA). **Randolph Co.:** SE of Coleman by hwy. 160, 10 Apr 2001, *R. Lance* 2117 (UWO); S of Cuthbert by US 27, 10 Apr 2001, *R. Lance* 2121 (UWO). **Richmond Co.:** Augusta, 21 Apr 1903, *A. Cuthbert* 935 (FLAS); Augusta, 24 Apr 1901, *A. Cuthbert s.n.* (FLAS); Augusta, 6 Jul 1882, *M.W. Ravenel s.n.* (MO); Augusta, 24 Apr 1902 *C.S. Sargent* 67 (UWO, photo); Augusta, 21 Apr 1902, *A. Cuthbert* 628 (FLAS). **NORTH CAROLINA. Cumberland Co.:** Fayetteville, 12 Oct 1908, *W.W. Eggleston* 4016a, (GH, NY); Fayetteville, Haymount, 12 Oct 1908, *W.W. Eggleston* 4017a (NY); Fayetteville, Haymount, 12 Oct 1908, *W.W. Eggleston* 4016 (NY). **Dublin Co.:** 2.6 mi N of Magnolia, 27 Apr 1957, *H.E. Ahles* 24051 (NCC). **Wake Co.:** Camp Crabtree waterfront, Wm. B. Umstead State Park, 22 Aug 1964, *G.P. Sawyer, Jr., H.E. Ahles & J.B. Whitney* 1539 (USCH). **SOUTH CAROLINA. Aiken Co.:** by US 302, W side, 12 Aug 1993, *J.B. Phipps* 6684 (UWO); Aiken, 12–15 Sep 1909, *W.W. Eggleston* 5031 (MO). **Horry Co.:** Little River, Neck Road, 1 May 1966, *J.F. Matthews, W.C. Williams & J.L. Kellerman s.n.* (UCC). **Lexington Co.:** Rte. 303, W side of road, 10 Apr 1991, *J.B. Phipps* 6504 (UWO).

Crataegus segnis Beadle

FLORIDA. Leon Co.: 3 mi N of Chaires, 29 Mar 1956, *R. Kral* 2160 (FSU). **Liberty Co.:** Torreya State Park, 22 Mar 1982, *R.K. Godfrey* 79451 (FSU). **Wakulla Co.:** Vicinity of Crawfordville, 29 Mar 1975, *R.K. Godfrey* 74196 (FSU). **Walton Co.:** Black Creek Rd. off US 331, 30 Mar 1975, *Mr. & Mrs. H.A. Davis* 16321 (FSU).

Crataegus sororia Beadle

ALABAMA. Calhoun Co.: No location, 7 Apr 1988, *R. Lance s.n.* (UWO). **GEORGIA. De Kalb Co.:** Yellow River, near Stone Mtn., 15 Jul 1899, *A.H. Curtiss* 6920 (DOV). **Floyd Co.:** Rome, hills above Silver Creek, Sep 1899, *C.D. Beadle s.n. but from 'type tree'* (A); Rome, Apr 1902, *C.S. Sargent s.n.* (A); Rome, hills above Silver Creek, cotype, 18 Apr 1899, *C.D. Beadle* 1257 (A); Rome, 22 Sep 1902, *C.D. Beadle* 7142 (A, 3); Rome, 26 Oct 1905, *T.G. Harbison* 2138 = *tree* 35 (A); Horseleg Mtn., Rome, 7 Oct 1982, *J.B. Phipps* 5176 (UWO); Horseleg Mtn., Rome, 4 Apr 1984, *J.B. Phipps* 5302 (UWO); Horseleg Mtn., Rome, 23 Apr 1983, *P.F. Ulf-Hansen* 020, 021 (UWO). **SOUTH CAROLINA. Aiken Co.:** Nr. Aiken, 4 Jun 1880, *G. Engelmann* 14 (MO); Hwy. 47 km E of jct. 394, 16 Apr 1999, *J.B. Phipps* 6512 (UWO).

Crataegus visenda Beadle

ALABAMA. Dallas Co.: Selma, 11 Apr 1912, *T.G. Harbison* 10827 (NCU); Rte. 140, ca. 9 mi E of Selma, 10 Apr 1998, *J.B. Phipps* 7689 (UWO). **Macon Co.:** 2.3 mi E of Tuskegee, 2 Apr 1973, (ALU). **FLORIDA. Clay Co.:** Magnolia Springs, 7 Apr 1920, *T.G. Harbison* 15678 (UWO, photo). Gadsden Co.: Chattahoochee, 5 Apr 1900, *C.S. Sargent s.n.* (DOV); River Junction at Dolan Road, 23 Jun 1983, *R.K. Godfrey* 79895 (UWO). **Jackson Co.:** Three Rivers State Park, N of Sneads, 10 Jun 1982, *R.K. Godfrey* 79854 (UWO). **Leon Co.:** no date, *T.G. Harbison* 5453 (NCU); 1.3 mi E of Micosukee, 7 Aug 1951, *H. Kurz s.n.* (FSU, 2); Tallahassee, 15 Apr 1920, *T.G.*

Harbison 15718 (NCU); Tallahassee, 24 Mar 1951, *H.A. Kurz s.n.* (FSU). **Liberty Co.:** Bristol, 2 Apr 1902, *T.G. Harbison 6022* (NCU); Bristol, 29 Mar 1902, *T.G. Harbison 6012* (TENN); Bristol, 30 Aug 1901, *T.G. Harbison 4031* (A); **Marion Co.:** Rainbow Springs, 11 Nov 1945, *H.R. Totten s.n.* (NCU). **Wakulla Co.:** E of Wakulla River, 13 Aug 1951, *H. Kurz s.n.* (FSU); no locality, 11 Apr 1966, *J. Beckner & W. D'Arcy s.n.* (FLAS); near Crawfordville, 2 Apr 1955, *R.K. Godfrey 53118* (ALU, FLAS, FSU, GA, NCSC, TENN, USF); 1.5 mi S of Crawfordville, 25 Mar 1982, *R.K. Godfrey 79461* (IBE). **GEORGIA. Randolph Co.:** SE of Coleman, W of Co. Rd., 4.2 mi N of jct. with unknown Hwy., 9 Apr 2001, *R. Lance 2114* (UWO).

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REFERENCES

- BEADLE, C.D. 1902. New species of thorns from the southeastern United States, II. Biltmore Bot. Stud. 1:62.
- BEADLE, C.D. 1903. *Crataegus*. In: J.K. Small. Flora of the southeastern United States, ed. 2. Author, New York.
- CRONQUIST, A. 1980. Flora of the southeastern United States. Univ. of North Carolina Press, Chapel Hill.
- KURZ, H. and R.K. GODFREY. 1982. *Crataegus*. In: Trees of Northern Florida. Univ. of Florida Press, Gainesville.
- MURRILL, W.A. 1942. New Florida hawthorns. Castanea 7:19–30.
- PALMER, E.J. 1925. Synopsis of North American *Crataegus*. J Arnold Arbor. 6:5–128.
- PALMER, E.J. 1960. *Crataegus*. In: R.A. Vines. Trees, shrubs and woody vines of the southwest. Univ. of Texas Press, Austin. Pp. 329–387.
- PHIPPS, J.B. 1988a. Re-assessment of *Crataegus flava* Aiton and its nomenclatural implications for the *Crataegus* serial name *Flavae* (Loud.) Rehd. and its sectional equivalent. Taxon 37:108–113.
- PHIPPS, J.B. 1988b. *Crataegus* (Maloideae, Rosaceae) of the southeastern United States, I. Introduction and series *Aestivales*. J. Arnold Arbor 69:401–431.
- PHIPPS, J.B. and K.A. DVORSKY. 2006. Review of series *Pulcherrimae* (*Crataegus*, Rosaceae). Sida 22:973–1007.
- PHIPPS, J.B., R.J. O'KENNON, and R. LANCE. 2003. Hawthorns and medlars. Timber Press, Portland, OR.
- PHIPPS, J.B., K.R. ROBERTSON, P.G. SMITH, and J.R. ROHRER. 1990. A checklist of subfam. Maloideae (Rosaceae). Canad. J. Bot. 68:2209–2269.
- SARGENT, C.S. 1890. Silva of North America. IV:113, t. 189.
- SARGENT, C.S. 1902. Silva of North America. XIII, suppl.:155, t. 693.
- TALENT, N. and T.A. DICKINSON. 2005. Polyploidy in *Crataegus* and *Mespilus* (Rosaceae, Maloideae): evolutionary inferences from flow cytometry of nuclear DNA amounts. Canad. J. Bot. 83: 1268–1304.
- TIDESTROM, I. 1933. *Crataegus*. In: J.K. Small. Manual of the southeastern flora. Univ. of North Carolina Press, Chapel Hill.



Phipps, J B and Dvorsky, K A . 2007. "REVIEW OF CRATAEGUS SERIES APRICAE, SER. NOV., AND C. FLAVA (ROSACEAE)." *Journal of the Botanical Research Institute of Texas* 1, 171–202.

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