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TAXONOMIC STATUS OF *FRAXINUS CORIACEA* (OLEACEAE)

GUY L. NESOM
2925 Hartwood Drive
Fort Worth, TX 76109, USA
www.guynesom.com

ABSTRACT

Fraxinus coriacea has been treated as a variety of *F. latifolia* (= *F. oregona*) and of *F. velutina*. Its geographic range is essentially intermediate (in southern California, Nevada, southwestern Utah, northwestern Arizona) between the two others. Intermediates apparently occur with each of the latter but *F. coriacea* can be recognized as a distinct entity on the basis of its morphology and geography and each is treated here at specific rank. Maps show the county-level distribution for each of the three and the detailed distributions of *F. latifolia* and *F. coriacea*. A lectotype is designated for *F. oregona* var. *glabra*.

KEY WORDS: *Fraxinus coriacea*, *F. velutina*, *F. latifolia*, taxonomy

Trees identified as *Fraxinus coriacea* S. Wats. (1873) from the southwestern USA have had an inconsistent taxonomic history. Sargent (1894) included *F. coriacea* in the synonymy of *F. velutina* but later (1902, p. 33) treated it as a distinct species and included Faxon's line drawing of it (reproduced here as Fig. 1). "In the sixth volume of this work [Silva of North America] *Fraxinus coriacea* was considered a form of *Fraxinus velutina*. It differs from that species in its fewer longer-stalked leaflets which are more coriaceous and more coarsely serrate, and in its range, *Fraxinus coriacea* being a tree of the mesas and low plains, while *Fraxinus velutina* is an inhabitant of mountain cañons; and with our still slight knowledge of the southwestern species of *Fraxinus* it is perhaps best to consider it a species." Still later, Sargent (1922) treated the southern California trees as *F. oregona* var. *glabra*, not recognizing *F. coriacea* even as a synonym: "the var. *glabra* in Los Angeles and San Bernadino Counties, and east of the Sierra Nevada in Inyo County (Ash Creek near Owens Lake), and occasionally northward in California."

Rehder (1917) apparently was the first to formally associate *Fraxinus coriacea* with *F. velutina*, treating it as *F. velutina* var. *coriacea* (S. Wats.) Rehder. Munz and Laudermilk (1949) observed that var. *coriacea* "is a recognizable variety of *F. velutina* with enough characters and distinct range, *F. velutina* itself not being known from California." They also (1949, p. 60) noted that "Rehder's *F. oregona* var. *glabra*, on the basis of plants so identified and of characters used and range given, seems to be a synonym of *F. velutina* var. *coriacea* as treated by Jepson (Fl. Calif. 3: 80, 1939)." *Fraxinus velutina* var. *coriacea* has been recognized by Lingelsheim (1920), Jepson (1939), Abrams (1951), Munz and Keck (1959), Shreve and Wiggins (1964), and Wiggins (1980).

Miller (1955) treated both *Fraxinus velutina* and *F. latifolia* as subspecies within her extremely broad concept of *Fraxinus pennsylvanica* and recognized *F. coriacea* simply as a synonym of *F. velutina*. Holmgren (1984) also included *F. coriacea* simply as a synonym of *F. velutina*, as did Wilken (1993), who recognized *F. velutina* as widely distributed in southern California and noted that it apparently hybridizes with *F. latifolia*. Wallander (2008) did not consider *F. coriacea* even as a synonym.

Among those who have recognized *Fraxinus coriacea* as a distinct entity, descriptions of its diagnostic features have been relatively consistent, and the present study also is in agreement. These trees are characterized by thick leaves, usually glossy above, typically broadly obovate and distally

serrate, often with minutely apiculate teeth. The lateral veins are prominent and slightly raised, 6–9(–13) on each side, arching upward, conspicuously parallel and running nearly to the margin before branching. A raised reticulum of smaller veins is prominent on both surfaces. The minute peltate scales on the leaflet abaxial surfaces appear to be slightly sunken into the epidermal surface. As noted by Munz and Laudermilk (1949) leaf vestiture varies from glabrous to hirtellous on both surfaces. They also found that *F. coriacea* differs from *F. latifolia* in microsculpturing of the abaxial leaflet surfaces — it differs in microsculpturing from *F. velutina* as well but less so than from *F. latifolia*.

Munz and Laudermilk (1949) noted that intermediates occur between *Fraxinus coriacea* and *F. latifolia*, especially in Tulare County, at the northern end of the range of *F. coriacea* and, according to them, at the southern extremity of *F. latifolia*. Owston's map (1990; reproduced as Fig. 5 in the present study) showed *F. latifolia* reaching slightly further south into northern Kern County, and Little (1971) mapped *F. latifolia* with a disjunct southern segment reaching through Ventura, Los Angeles, and San Bernadino counties.

Observations in the present study also indicate that *Fraxinus latifolia* sensu stricto reaches the southern counties of California, although uncommon there, where it may account for some of the variability in *F. coriacea*. The distinctive, stiffly curving, partially reclining foliar hairs (abaxial surfaces) of *F. latifolia* never occur in *F. coriacea* but are abudantly produced by plants of the following collections. **Los Angeles Co.**: La Tuna Canyon, Verdugo Hills, sandy wash, 26 Mar 1933, *MacF s.n.* (NY). **Riverside Co.**: southern Santa Ana Mts., San Mateo Canyon Wilderness Area, along San Mateo Creek from Riverside Co. line, following San Mateo Trail upstream to confluence with Bluewater Canyon, riparian, 800-100 ft, 23 Apr 1992, *Boyd 7068* (NY). **San Diego Co.**: Hot Springs, Jun 1880, *Vasey 365* (NY); Cleveland Natl. Forest, Trabuco District, Rd 7504 at jct with Alamos Canyon Creek, riparian habitat in chaparral, 200 m, 8 Mar 1995, *Walker 1236* (NY); along Cottonwood Creek, 2.3 mi above Barrett Store, on road to Barrett Dam, 1100 ft, 28 Oct 1940, *C.B. Wolf s.n.* (TEX; this specimen from a cultivated tree in RSA Botanic Garden, grown from the original collection by Wolf).

In summary and conclusion, *Fraxinus coriacea* has been consistently recognized as a distinct entity in studies with a broader purview, although it has sometimes been treated as an element within *F. velutina*. The current study further confirms its apparent morphological and geographical reality. In view of its discrete geographical range and intermediate position between *F. velutina* and *F. latifolia*, hybridization and intermediacy between these two and *F. coriacea* probably is less common than previously suspected. In fact, given its allopatric distribution, *F. coriacea* seems relatively simply to identify and treatment at specific rank appears to be justified.

Fraxinus coriacea and *F. latifolia* can be distinguished by the following contrasts.

1. Leaflets relatively thick, venation distinctly raised on both surfaces, blades mostly obovate, glabrous or hirtellous with straight, erect hairs, margins toothed on distal 1/2–1/3 to entire; lateral petiolules 5–10(–13) mm ..... **Fraxinus coriacea**
1. Leaflets relatively thin to thickened, venation not raised, blades mostly oblong elliptic-oblong to oblong-ovate or oblong-obovate, sparsely to densely villous abaxially with stiffly curving, reclining hairs, margins usually entire; lateral petiolules 0(–3) mm ..... **Fraxinus latifolia**

Intermediates also apparently occur between *Fraxinus coriacea* and *F. velutina*, especially in southwestern Utah in the restricted region where there ranges apparently come into contact. Other plants within the range of *F. velutina*, especially in Arizona, sometimes may appear close in

morphology, at least superficially, to *F. coriacea*, but the two distinct geographic elements are clear and the two taxa can be distinguished by the following contrasts.

1. Leaflet blades relatively thick, peltate scales somewhat sunken into abaxial epidermis, venation distinctly raised on both surfaces; lateral petiolules 5–10(–13) mm ..... **Fraxinus coriacea**
1. Leaflet blades relatively thinner, peltate scales superficial on abaxial epidermis, venation not distinctly raised; lateral petiolules 0(–2) mm ..... **Fraxinus velutina**

Fraxinus coriacea S. Wats., Amer. Naturalist 7: 302. 1873. *Fraxinus velutina* var. *coriacea* (S. Wats.) Rehder, Proc. Amer. Acad. Arts 53: 206. 1917. *Fraxinus pistaciifolia* var. *coriacea* (S. Wats.) A. Gray, Syn. Fl. N. Amer. 2(1): 74. 1878. **LECTOTYPE** (Rehder 1917): **USA. Nevada**. [Nye Co.:] Ash Meadows, 1871, *Lieut. Wheeler s.n.* (GH; isolectotype: NY digital image!; probable isolectotype: GH!).

Fraxinus oregona var. *glabra* Lingelsh. ex Rehder, Proc. Amer. Acad. Arts 53: 207. 1917. **LECTOTYPE** (designated here): **USA. California**. [Tulare Co.:] Along creeks, Greenhorn Mountains, 3000–4000 [ft], Apr-Sep 1897, *C.A. Purpus 5555* (US digital image!; isolectotype: UC). Rehder also cited collections by Abrams (San Bernadino Co.) and Abrams & McGregor (Los Angeles Co., San Bernadino Co.). He noted that an attempt by Lingelsheim in 1907 to describe this species resulted in a nomen nudum. Lingelsheim (1920, p. 43) still later treated *F. oregona* "Var. β glabra nov. var. Lingelsh." citing "(Parish n. 540!, Wright!). — Scheint auf Californien beschrankt zu sein. — In Kultur noch selten."

Trees 5–10 m; twigs terete; bark light gray; winter buds brown. **Leaves** deciduous, pinnately compound, 6–15(–20) cm, leaflets (3–)5(–7, rarely), yellow-green on both surfaces, glossy adaxially, glabrous to sparsely to moderately hirtellous on both surfaces, not papillose, blades (2–)3–10 cm x 2–5.5 cm, broadly obovate to broadly elliptic-obovate or subrotund, apices obtuse or subtruncate to long-acuminate, base obtuse to acute or acuminate, margins usually shallowly serrate on distal 1/2–2/3 and often with apiculate teeth; petioles 15–35(–55) mm, bases slightly raised, leaf scars thin to thick crescent-shaped, 3–4 mm wide; petiolules 5–10(–13) mm. **Flowers** unisexual (species dioecious), appearing before the leaves, wind-pollinated; pistillate calyx ca. 1 mm, persisting at base of samara; petals absent. **Samaras** 18–32 mm, body plump and subcylindric, wings 2, gradually expanded from near the middle of the body, 4–6 mm wide at the widest point, often notched at the apex. 2n = 46 (Wright 1957), 2n = 92 (Taylor 1945).

Flowering Apr–Jun. Sandy flats, gravelly washes, irrigation ditches, river banks, canyon bottoms, cliff bases, desert shrub, chaparral, digger pine, digger pine-Douglas oak, ash-leaved maple; (700–)800–1700(–2100) m; Ariz., Calif., Nev., Utah. Reported from Baja California (Munz & Keck 1959; Wiggins 1980, "sw flank of the Sierra San Pedro Martir"). Welsh et al. (2003) noted that *F. velutina* occurs in southeastern Iron Co. and western Kane Co. — I have not seen the specimens to document this but they should be examined to confirm their distinction from *F. coriacea*.

Shreve and Wiggins (1964, p. 1087)) noted for *Fraxinus velutina* var. *coriacea* that "A specimen that may belong here was collected in the foothills near the southwest flank of the Sierra San Pedro Martir in Baja California." Wiggins (1980) also cited "sw flanks of Sierra San Pedro Martir" for the taxon.

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Figure 1. Line drawing of *Fraxinus coriacea* by Charles Faxon, from Sargent (1902).

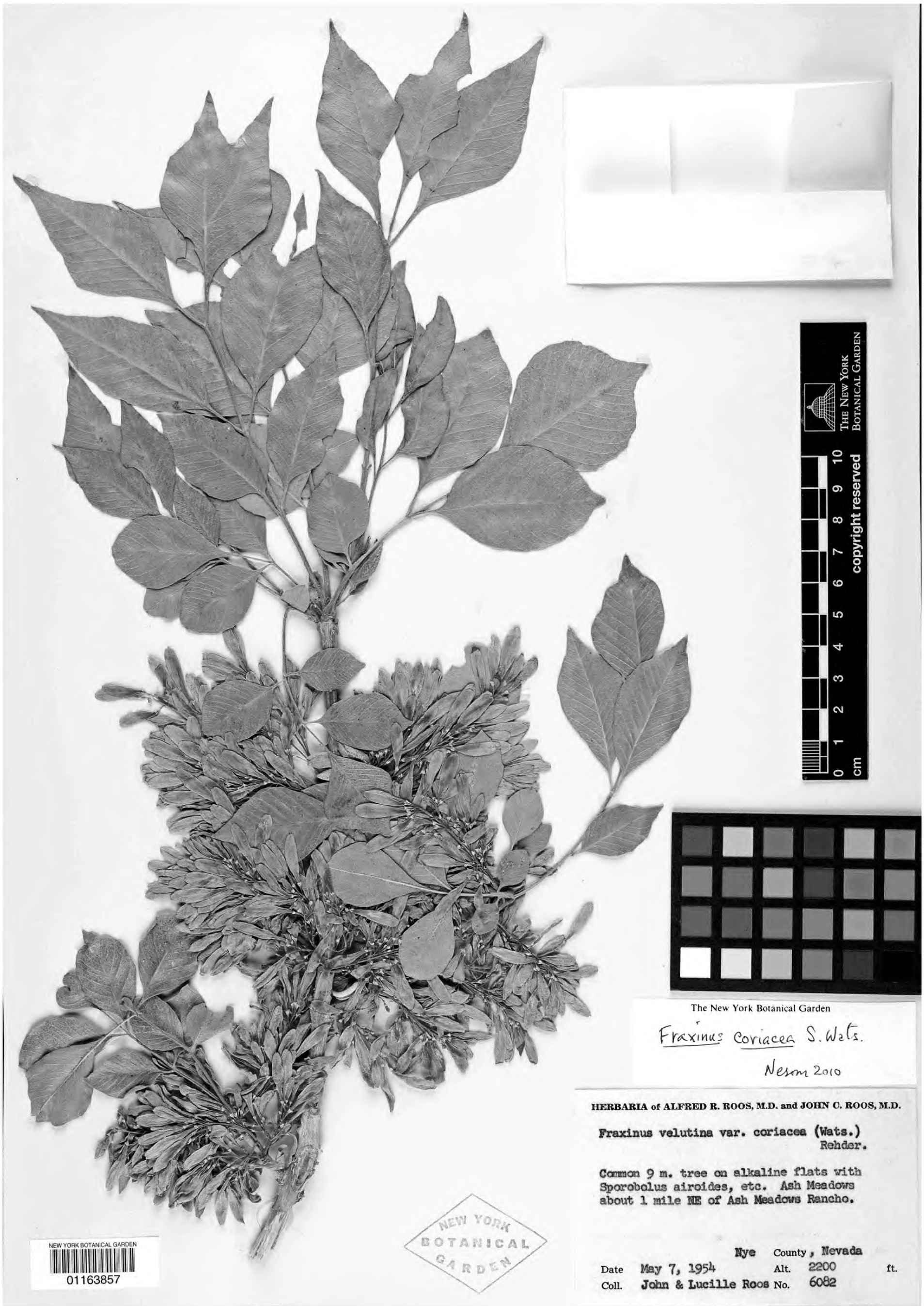

Figure 2. Representative specimen of *Fraxinus coriacea* from Nye Co., Nevada (*Roos 6082*, NY).

Figure 3. Details of leaves (Nye Co., Nevada, *Roos 6082*, NY) and fruits (Clark Co., Nevada, *Williams 80-32-J*, NY)

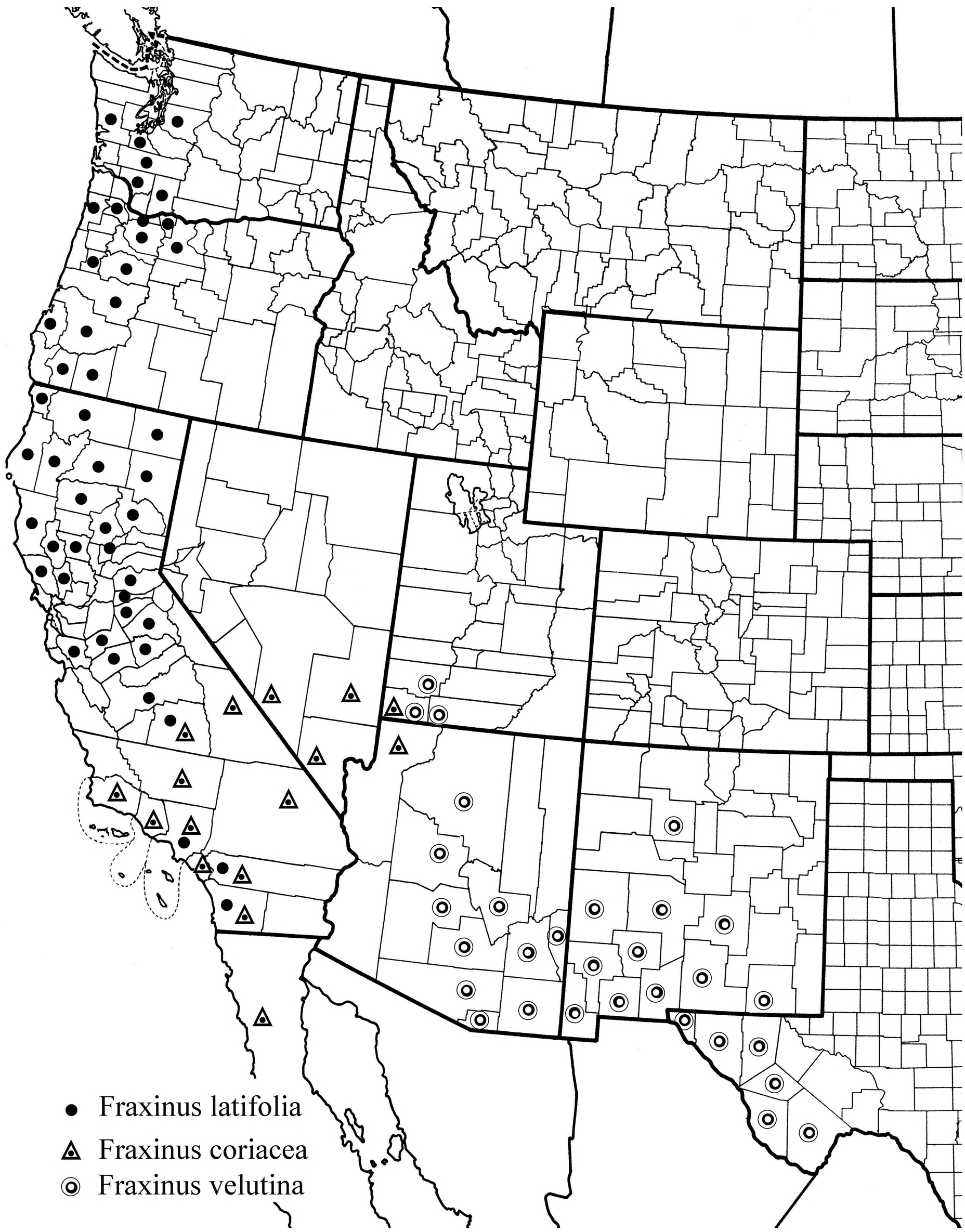

Figure 4. County distributions (native range) of *Fraxinus coriacea*, *F. latifolia*, and *F. velutina*. The range of *F. velutina* extends into Mexico. Welsh et al. (2003) noted that *F. velutina* (? = *Fraxinus coriacea*) also occurs in southeastern Iron Co. and western Kane Co., Utah — symbols in those counties are based on their report.

Figure 5. Native range of *Fraxinus latifolia*, from Owston (1990). The range is extended southward in the present study (see Fig. 4 and text).

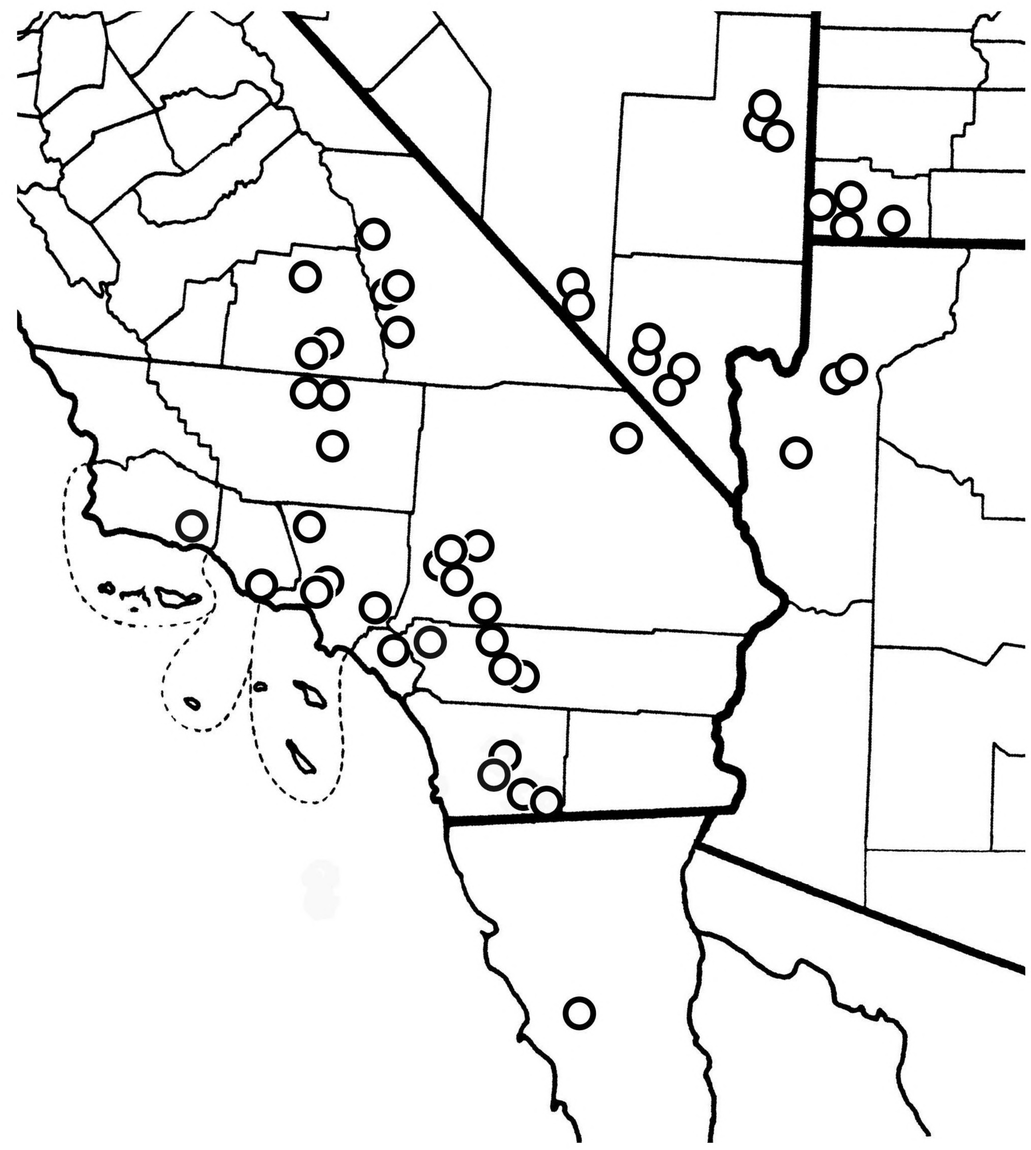

Figure 6. Detailed geographic distribution of *Fraxinus coriacea*. Some localities have been added from Munz and Laudermilk (1949); the symbol for Baja California also is added from literature; see notes in text.