

**FRANGULA BETULIFOLIA AND F. OBOVATA
(RHAMNACEAE)
ARE DISTINCT SPECIES**

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ABSTRACT

Frangula betulifolia var. *obovata* occurs in northern Arizona, Nevada, Utah, and Colorado and is geographically disjunct from var. *betulifolia*, which occurs in southern Arizona, New Mexico, Texas, and northern Mexico. The two taxa are consistently different in leaf shape and texture, and with their genetic isolation, each is appropriately treated at specific rank. A new combination to this effect is made here: **Frangula obovata** (Kearney & Peebles) Nesom & Sawyer, **comb. et stat. nov.** *Phytologia* 91(2): 300-307 (August, 2009).

KEY WORDS: *Frangula betulifolia*, *F. obovata*, *F. ×blumeri* Rhamnaceae, taxonomy.

Frangula (Rhamnus) betulifolia (Greene) Grubov has been treated without formal variants by Johnston (1971), Johnston and Johnston (1969, 1978), Cronquist et al. (1997), and Welsh et al. (2003). In contrast, *Rhamnus betulifolia* var. *obovata* Kearney & Peebles was described by botanists working in Arizona, the only state where both of the putative varieties occur, and a recent treatment for Arizona maintains them as separate (Hill 2008). Although Cronquist et al. (1997) identified the plants as *R. betulifolia*, the corresponding illustration in his treatment depicts var. *obovata*.

According to Kearney and Peebles (1960, p. 532), "The typical plant [of *Frangula betulifolia*], with elliptic or oblong leaves, is limited in Arizona to the south-central and southern counties. In the

northern part of the state is found var. *obovata* Kearney & Peebles, the type of which was collected on Navajo Mountain, Coconino County. This variety is apparently common in and near the Grand Canyon and Havasu Canyon, and extends into southern Utah and Nevada, thus being well separated geographically from the main area of *R. betulifolia*. The variety is characterized by more or less obovate leaves with thicker, more prominent veins.”

The current study corroborates the observations of Kearney and Peebles. The two taxa are consistently and discontinuously different in leaf morphology. Var. *betulifolia* occurs from northern Mexico into southeastern Arizona, southern New Mexico, and trans-Pecos Texas; var. *obovata* is geographically disjunct and occurs in northern Arizona and adjacent Nevada, Utah, and Colorado (Figs. 1 and 2). In view of their morphological and geographic distinction, recognition of each at specific rank is appropriate.

- 1. Leaf blades elliptic to oblong, elliptic-ovate, or narrowly ovate, 1.6–2.6(–2.9) times longer than wide, relatively thin or slightly thickened, paler beneath, lateral veins (8–)9–13 pairs
.....**Frangula betulifolia**
- 1. Leaf blades obovate to oblong-obovate or oblong, 1.2–1.8(–2.5) times longer than wide, distinctly thickened and nearly coriaceous, evenly colored on both surfaces, lateral veins (5–)6–8(–9) pairs.
.....**Frangula obovata**

Frangula betulifolia (Greene) Grubov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 8: 268. 1949. *Rhamnus betulifolia* Greene, Pittonia 3: 16. 1896. TYPE: USA. New Mexico. [Catron Co.:] along streams, Mogollon Mountains, 20 Jul 1881, *H.H. Rusby* 63 (holotype: US-digital image!; isotypes: MO!, NY-digital image!).

Shrubs or small trees 1–4 m, unarmed, stems brown to gray-brown, glabrous or pubescent. **Leaves** deciduous, alternate, petioles (2–)5–16 mm, blades elliptic to oblong, elliptic-ovate or narrowly ovate, (4–)4.5–10 cm x (2–)2.5–5.5 cm, 1.6–2.6(–2.9) times longer than wide, thin or thickened but not coriaceous, green above, yellowish and paler beneath, hirtellous to hirsutulous on both surfaces, glabrescent,

lateral veins (8–)9–13 pairs, margins serrate to subcrenate, not revolute, apices acute to obtuse, sometimes slightly acuminate, bases obtuse to truncate or rounded. **Flowers** bisexual, 5-merous, 2–20(–38) in pedunculate axillary fascicles, peduncles (flower) (0–)1–10 mm, pedicels (flower and fruit) 3–7 mm. **Stigmas** 3-lobed. **Drupes** globose, 5–10 mm, black, stones (2–)3(–4).

Flowering Apr–Jun. Cliff bases, ledges, moist canyons, ridges, roadsides, rocky slopes, stream banks, Gambel's oak, oak-pine, pine-walnut-maple, white fir; 900–2750 m. Ariz., N.Mex., Tex.; Mexico (Chihuahua, Coahuila, Durango, Nuevo León, Sonora, Tamaulipas).

Powell (1997) observed that “The leaves of the specimens from the Guadalupe Mountains are smaller and thinner in texture than those of the Davis Mountains population.” Such a difference has not been confirmed here among numerous specimens examined from both areas.

Frangula obovata (Kearney & Peebles) Nesom & Sawyer, comb. et stat. nov. *Rhamnus betulifolia* var. *obovata* Kearney & Peebles, J. Wash. Acad. Sci. 29: 486. 1939. *Frangula betulifolia* subsp. *obovata* (Kearney & Peebles) Kartesz & Gandhi, Phytologia 76: 448. 1994. TYPE: USA. Arizona. Coconino Co.: Near Rainbow Lodge, N end of Navajo Mt., 1920 m, 11 Jun 1938, R.H. Peebles 13930 with E.G. Smith (holotype: US-digital image!; isotypes: MO!).

Shrubs 1–2.5 m, unarmed, stems red to brown or gray-brown, glabrous or pubescent. **Leaves** deciduous, alternate, petioles 5–14 mm, blades obovate to oblong-obovate or oblong, (4–)5–9 cm x 3.2–6 cm, 1.2–1.8(–2.5) times longer than wide, distinctly thickened and nearly coriaceous, green and minutely puberulous to hirtellous on both surfaces, glabrescent, lateral veins (5–)6–8(–9) pairs, margins minutely serrate to nearly entire, not revolute, apices obtuse to truncate or rounded, bases truncate to subcordate. **Flowers** bisexual, 5-merous, 2–12 in pedunculate axillary fascicles, peduncles (flower) 3–8(–20) mm, pedicels (flower and fruit) 3–10 mm. **Stigmas** 3-lobed. **Drupes** globose, 5–8 mm, black, stones 3.

Flowering Apr–Jun. Canyon bottoms, cliff faces, stream and creek banks, hanging gardens, talus, seepage below cliffs; 1350–2350 m. Ariz., Colo., Nev., Utah.

Frangula obovata has been collected infrequently in Nevada, but the identity of the plants there is unequivocal. Nevada. Clark Co.: Sheep Range, Grapevine Spring area, *Rhamnus*-white fir, 6300 ft, 19 Sep 1978, *Ackerman 31463* (TEX); Charleston (Spring) Mountains, Kyle Canyon, gravelly side of ravine with *Pinus ponderosa* var. *scopulorum* and *Cercocarpus ledifolius*, 2425 m, 11 Aug 1937, *Clokey 7579* (LL, TEX). Wolf (1938) cited the same Clokey collection as well as one other collection of “*Rhamnus betulifolia*” from Kyle Canyon (24 Jun 1926, *Jaeger s.n.*, CAS).

Other plants from the Charleston Mountains are nearly identical to many of *Frangula californica* var. *ursina* over its wider range, with coriaceous, abaxially whitened leaves with a dense, close tomentum of stellate hairs: Clark Co.: gravelly wash a mile N of Wilson’s Ranch, *Larrea* belt, 1200 m, 13 Jul 1939, *Clokey 8415* (MO-2 sheets, TEX); Excelsior Canyon, 1200 m, 7 Sep 1941, *Clokey 8762* (MO, TEX); La Madre Mts, Willow Spring, 3 May 1988, *Liston & Meury 740-2* (TEX).

Harrington (1954) noted that *Rhamnus betulifolia* “has been reported close to southwestern Colorado [in Utah] and may be growing in that part of the state.” Most listings of this species in Colorado perhaps have been based on Harrington’s inclusion, but recent accounts of the Colorado flora (e.g., Weber & Wittman 1992; Hartman & Nelson 2001; Snow 2007) have not included it. A collection from La Plata County in southwestern Colorado is identified in the forthcoming Four Corners Flora (Spence 2008) as *Frangula betulifolia*, but it is here recognized as *F. obovata*: La Plata Co.: Fort Lewis College on Ft. Lewis hill, 28 Jun 1976, *V. Murray s.n.* (SJNM 2118).

Wolf (1938, p. 78–79) noted that a collection from Cochise Co. in southeastern Arizona named as *Rhamnus blumeri* Greene appears to be a hybrid between *Frangula californica* var. *ursina* and *F. betulifolia*. Both the holotype (US) and an isotype (DS) “have two pieces of material on them: the one is a vegetative branch which is

obviously *R. betulifolia*, the other the material upon which Greene based his species. The latter resembles *R. californica ursina*, but is larger in leaf size and has less pubescence. In 1928, I collected around Paradise and obtained material of *R. betulifolia* (C.B. Wolf 2595). The other collections were made from large bushes resembling *R. californica ursina* in habit but only lightly pubescent on the under surfaces of the leaves. These suggest intermediates between *R. californica ursina* and *R. betulifolia*, but are slightly different from the type of *R. blumeri*: Collections: C.B. Wolf 2592 (RSA), 2593 (RSA).” Study of an isotype of *R. blumeri*, specimens of Wolf 2592 (MO), Wolf 2593 (MO), Wolf 2595 (MO-2 sheets), and Wolf & Everett 11384 (TEX), essentially corroborate Wolf’s observations. From numerous other collections of both species from the Chiricahua Mountains, however, we conclude that if hybridization has taken place between *F. betulifolia* and *F. californica* in Cochise Co., it apparently has not been a common occurrence and there is no evidence at hand of introgression.

Frangula ×**blumeri** (Greene) Kartesz & Gandhi, Phytologia 76: 448. 1994. *Rhamnus blumeri* Greene, Leaflet. Bot. Observ. Crit. 2:266. 1912. TYPE: USA. Arizona. Cochise Co.: Chiricahua Mountains, Paradise, small tree near creek, 5300 ft, 28 Aug 1906, J.C. Blumer 1290 (holotype: US, digital image!; isotypes: DS, MO!).

Johnston (1971) noted that *Frangula betulifolia* is “extremely similar to, and probably conspecific with [*Frangula caroliniana* (Walt.) A. Gray]” of eastern North America. The two taxa are closely similar, but they are allopatric and have never been formally merged into a single species.

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LITERATURE CITED

- Albee, B.J., L.M. Shultz and S. Goodrich. 1988. The Atlas of the Vascular Plants of Utah. Utah Museum of Natural History. Digital version <<http://www.gis.usu.edu/Geography-Department/utgeog/utvatlas/>>. Accessed January 2009.
- Cronquist, A., N.H. Holmgren and P.K. Holmgren. 1997. Vascular Plants of the Intermountain West, U.S.A. Vol. 3, Part A: Subclass Rosidae (except Fabales). New York Botanical Garden Press.
- Harrington, H.D. 1954. Manual of the Plants of Colorado. Sage Books, Denver, Colorado.
- Hartman, R.L. and B.E. Nelson. 2001. A Checklist of the Vascular Plants of Colorado. Rocky Mountain Herbarium, Univ. of Wyoming, Laramie. <<http://www.rmh.uwyo.edu/colorado/colcklist.word.doc>> Accessed January 2009.
- Hill, M.-E. 2008. *Frangula*. In Christie, K., M. Currie, L.S. Davis, M.-E. Hill, S. Neal and T. Ayers. Rhamnaceae. Vascular Plants of Arizona Project. Deaver Herbarium, Northern Arizona University, Flagstaff. Accessed Jan. 2009.
<<http://www4.nau.edu/deaver/VPA%20RHAMNACEAE.pdf>>
- Johnston, M.C. 1971. Manual of the Vascular Plants of Texas. Texas Research Foundation, Renner, Texas.
- Johnston, M.C. and L.A. Johnston. 1969. Rhamnaceae, in Flora of Texas 2 (pt. II):357–388.
- Johnston, M.C. and L.A. Johnston. 1978. *Rhamnus*. Flora Neotropica 20:1–96.
- Kearney, T.H. and R.H. Peebles. 1960. Arizona Flora (ed. 2 with supplement by J.T. Howell, E. McClintock and collaborators. University California Press, Berkeley.
- Powell, A.M. 1997. Trees and Shrubs of the Trans-Pecos and Adjacent Areas. Univ. of Texas Press, Austin.
- Snow, N. 2007. Checklist of Vascular Plants of the Southern Rocky Mountain Region (Version 2).
<http://www.conps.org/pdf/Plant%20Lists/SRMRCchecklist_2007_Version2_Final.pdf> Accessed Jan. 2009.
- Spence, J. In press (2008). Rhamnaceae. In Heil, K.D., S. O'Kane, and L. Reeves (eds.). Flora of the Four Corners Region: Vascular Plants of the San Juan River Drainage—Arizona, Colorado, New Mexico, Utah. Missouri Botanical Garden Press, St. Louis.

- UVSC Virtual Herbarium. 2008. Utah Valley State College, Orem, Utah. <<http://herbarium.uvsc.edu/Virtual/>> Accessed Jan. 2009.
- Weber, W.A. and R.C. Wittman. 1992. Catalog of the Colorado Flora: A Biodiversity Baseline. University of Colorado Museum, University Press of Colorado, Boulder.
- Welsh, S.L., N.D. Atwood, S. Goodrich and L.C. Higgins. 2003. A Utah Flora (ed. 3). M.L. Bean Life Science Museum, Brigham Young University Press, Provo, Utah.
- Wolf, C.B. 1938. The North American species of *Rhamnus*. Botanical Series No. 1. Rancho Santa Ana Botanic Garden, Claremont, California.

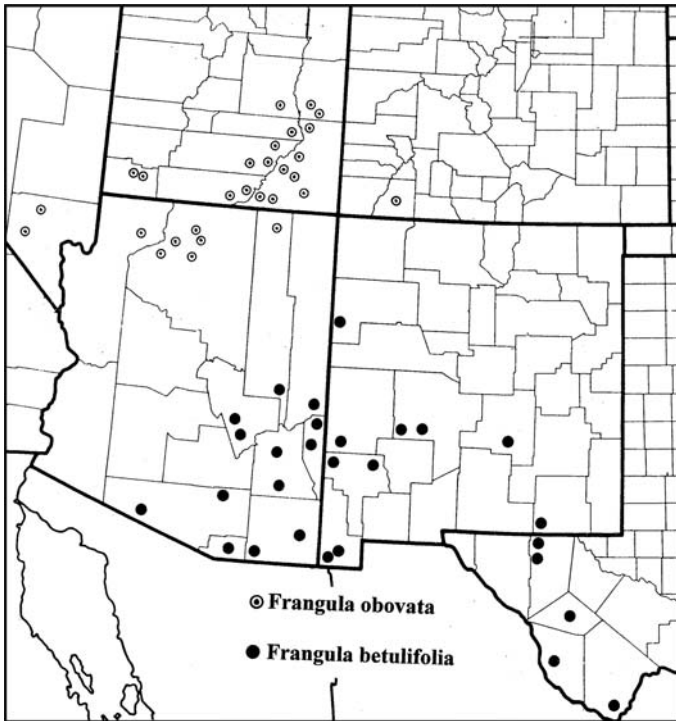


Figure 1. Geographic distribution of *Frangula betulifolia* and *F. obovata* in the U.S.A. Map points are from specimens at LL, MO, SJNM, and TEX, augmented by records from Hill (2008), UVSC Virtual Herbarium (2008), and Albee et al. (1988).

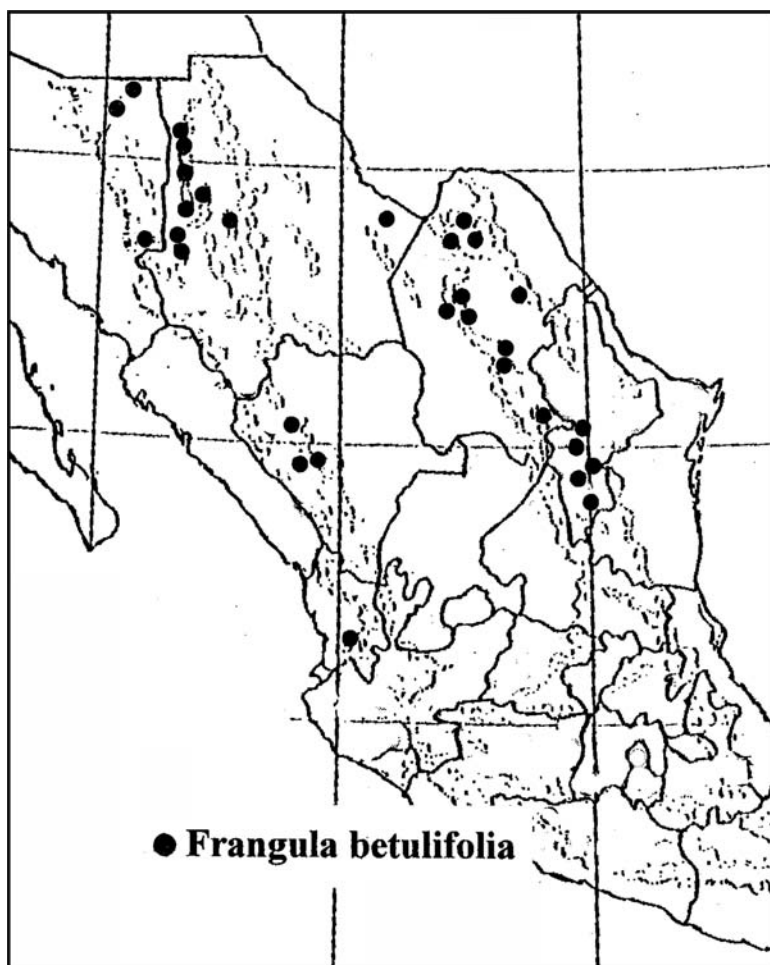


Figure 2. Geographic distribution of *Frangula betulifolia* in Mexico.