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# *QUERCUS BARRANCANA* (SECT. *QUERCUS*, WHITE OAKS), A NEW SPECIES FROM NORTHWESTERN MEXICO

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## ABSTRACT

**Quercus barrancana** Spellenb., **sp. nov.**, a white oak (sect. *Quercus*), is described from southwestern Chihuahua and southeastern Sonora in northwestern Mexico. It is a small-leaved evergreen oak primarily of the barranca (canyon) country on the west slope of the Sierra Madre Occidental. The new species differs from the more northern *Q. toumeyi* Sarg. by having most leaves on the tree usually toothed on their margins and the adaxial surfaces bearing spirally contorted multirayed hairs. It is a small tree or shrub, finding some use as firewood. The acorns are eaten by indigenous people.

From the start of our explorations of the flora of the northern Sierra Madre Occidental in the early 1980s, we have been aware of a well-defined southern population of a white oak (sect. *Quercus*) usually identified as *Quercus toumeyi* Sarg., occasionally as *Q. arizonica* Sarg., or as annotated by J. Tucker on a few large-leaved specimens at DAV, as an intergrade between the two species. In a review of oaks of the region (Spellenberg 2001a) this oak was included within *Q. toumeyi*, with distinctions briefly explained for this southern population. Since that time it was necessary to return specimens borrowed from other herbaria; these were annotated as "*Q. toumeyi* southern phase" or "*Q. barrancana*" as a name *ined*. For a short period I considered this southern population to be best considered as a variety. Finally, however, this small oak is recognized as a species closely allied to *Q. toumeyi*, a view consistent with a species concept for oaks as proposed by Nixon (1993). The distinctions of the new species formally recognized here were commented upon by Felger et al. (2001), where he discussed differences between northern and southern races of *Q. toumeyi*.

**QUERCUS BARRANCANA** R. Spellenberg, **sp. nov**. (Fig. 2).

**TYPE: MEXICO. Chihuahua**. Mpio de Guachochi: 50 km S of of Creel, 13 km N of crossing of Río Urique, 6.5 km N of Humira, E of present highway Mex. 23, along old road, 27° 26' 58.6" N; 107° 29' 21.9" W, elev. 2115 m, 28 Aug 2004, *R. Spellenberg and W. Anderson 13487* (holotype: NY; isotypes: ARIZ, CIIDIR, IBUG, IEB, MEXU, NMC, NY, TEX, UC, US, USON). The type collection *13487* encompasses a small population sample made at the same time and same place, but from different trees in the population, each tree designated by a letter (a-f). To help locate specimens in the future and associate them with others of the series, the distribution of this collection is as follows: MEXU, NY (tree a); NMC, TEX (tree b); US (tree c); MO, USON (tree d); CIIDIR, IBUG (tree e); ARIZ, IEB UC (tree f).

*Quercus barrancana* is similar to *Q. toumeyi* in habit and features of flower and fruit. Both species inhabit dry rocky sites. *Quercus barrancana* differs by features of leaf margin dentation and pubescence of the abaxial leaf surface, and to a lesser extent in leaf shape. The small, toothed leaves, small acorns, and the contorted multirayed hairs also distinguish *Q. barrancana* from other oaks in the region.

**Shrubs or small trees** 1–5 m tall with one to several trunks 3–15 cm diam., often contorted, sometimes sprouting from stumps, the crown round or broadly oval, 1–6 m broad, the branches ascending to spreading (Fig. 4). **Twigs** shaggy-pilose with loosely appressed and a few spreading

stellate hairs with crinkled branches in first year; more sparsely pubescent in second year; glabrous or glabrate in third, the surface reddish brown and becoming shallowly fissured, flaking on larger branchlets. Lenticels raised, whitish, ca. 1 mm diam. on 3rd-year twigs. Buds broadly oval to globose, 1 mm long, bronze-orange, lustrous, lightly to moderately pubescent with crinkled hairs on margins of bud scales. **Foliage** evergreen (may be drought deciduous) dense, dark green. **Leaves** oval, narrowly ovate, oblong, oblong-elliptic, or slightly obovate (Fig. 5, 6), 12–36 mm long, 6–15 mm wide (up to 40 mm long, 18 mm wide on fast-growing shoots), base rounded to shallowly cordate, tip obtuse to rounded, with a low callus-tipped point, margin usually with at 1–4 low teeth in two-thirds of blade, each tooth with a callus-tipped point. Marginal teeth 0.5–1 mm high (2–3 mm on leaves from fast growing young shoots), asymmetric and forward pointing (steeply ascending on side toward leaf tip, gradually ascending on side toward leaf base). Young leaves densely pale pubescent with spreading, multi-multirayed hairs on both surfaces, those near the margin and over the midvein often reddish, the hairs decreasing in density as leaf ages. Adaxial surface of mature blade with scattered multirayed crinkled hairs or glabrate, lustrous, with a prominent slightly depressed central vein and weaker lateral veins, the veinlets pale, forming a reticulum even with surface of blade. Abaxial surface of blade dull, the midvein prominently raised, the lateral veins less so, the veinlets inconspicuous; surface sparsely to moderately pubescent with often spirally contorted multirayed hairs and appressed, often sparse, pale whitish or yellowish glandular vermiform hairs (Fig. 7). Veins 5–9 on each side of blade, ending in reticulum of veinlets near teeth or margin, more or less anastomosing through looping smaller veinlets. **Staminate catkins** greenish yellow (appearing late March through early June), slender, spreading or pendulous, 18–23 mm long, 3 mm diam., the axis sparsely to densely pubescent with spreading crinkled hairs, bearing 10–15 flowers; involucre 4–5 lobed, 0.9–1.3 mm long, the lobes lance-ovate, ovate, oblong, to nearly round, free for 1/2–2/3 length, crinkly pilose on back, the margin irregularly toothed or ± entire, or entire but lacerate at tip, ciliate with crinkly hairs 02.–04 mm long that are sometimes reddish; stamens from 3 to usually 5 per flower, filaments 0.5–1.5 mm long, anther 1–1.5 mm long, greenish yellow. **Acorns** maturing from late June to mid-September, fusiform, olive brown, 12–19 mm long, 8–10 mm wide, approximately 1/4–1/3 covered by cap (Fig. 8); involucre 4–7 mm high, 6–11 mm wide, yellowish brown, densely short-tomentose, the center of the scales glabrous or glabrate, usually borne singly on peduncles 1–4 long, occasionally in clusters of 2–6 on peduncles up to about 2 cm long.

Igneous, rocky, slopes and banks, at 1300-2115 m elev., with *Agave, Ageratina, Arbutus, Bidens, Muhlenbergia, Opuntia, Stevia, Pinus chihuahuana, Pinus engelmannii, Juniperus* etc., in dry oak woodland or pine-oak woodland, often forming thickets (Fig. 1, 4). Commonly associated with, or in vicinity of, *Q. chihuahuensis* Trel., *Q. grisea* Liebm., *Q. arizonica* Sarg., *Q. jonesii* Trel., *Q. mcvaughii* Spellenb., *Q. oblongifolia* Torr., *Q. tarahumara* Spellenb., Bacon, & Breedlove, and *Q. viminea* Trel.

The epithet "*barrancana*" refers to the habitat of the species. Much of its range is in the large, steep walled, rocky canyons (*barrancas*) in eastern Sonora and western Chihuahua, on the west slope of the Sierra Madre Occidental.

**Geographic range**

*Quercus barrancana* is found in northwestern Mexico from Mpio. de Tomósachi (Chihuahua) and Mpio. de Yécora (Sonora) southward to Mpio. de Alamos (Sonora) and Mpio. de Guachochi (Chihuahua) (Fig. 3).

The range of *Quercus toumeyi* (Fig. 3) lies to the north in the Sierra Madre of Mexico and in the Sky Island region (USDA Forest Service 1995) in the southwestern USA, extending from Pima, Cochise (Arizona), and Hidalgo (New Mexico) counties at the northern end of its range to municipios de Yécora (Sonora) and Madera (Chihuahua) in the south. The presence of *Q. toumeyi* in extreme western Texas, as related by Nixon and Muller (1997), is apparently based upon a small set of

collections from the northern Quitman Mountains, at the south end of Smuggler's Gap, in Hudspeth Co., made on 15 Jun 1976 (*Butterwick & Lamb 2720, 2721, 2722*, LL). These have small, broadly lanceolate leaves characteristic of *Q. toumeyi* but have soft stellate hairs on the abaxial surface in addition to pale, glandular vermiform hairs. They may represent forms of *Q. turbinella* Greene with small toothless leaves, resulting from introgression with *Q. grisea* Liebm. I cannot, however, exclude them from introgressed *Q. toumeyi*. Similar plants also occur to the north, in the Franklin Mts. of El Paso Co., made on 27 July, 1989 (*Spellenberg 9982*, BRIT, MEXU, MO, NMC, NY, SRSC, TEX, US, UTEP). While making that collection I found no plants that were "good" *Q. toumeyi*.

**Putative relationships and taxonomic rank**

Hybridization and intergradation among oak species is common (Nixon 1993), as it is in the Sierra Madre Occidental (Spellenberg 2001b), usually surmised to be occurring by the presence of trees intermediate between two more widespread morphologically different species. The same holds for *Quercus barrancana* in eastern Sonora and western Chihuahua in its area of contact with *Q. toumeyi*. Intergrades are listed in specimens cited. These intergrades have comparatively broad leaves with few or no teeth and a reduced density of contorted branched hairs on the lower surface. Some specimens of *Q. chuchuichupensis* Muller, cited by Muller, are among these intergrades (see discussion of these specimens below, in the specimens cited section). LeSeuer's specimens form the type collection and represent *Q. toumeyi*.

**Vernacular name and human uses of *Quercus barrancana*.**

Occasional specimens give vernacular name and/or human uses, the collector often learning this information from a local associate. Names I have seen on specimens of *Quercus barrancana* are these: *ncino chakira* (Sonora, language not stated; *Sanchez-Escalente s.n.*); *makóchare* (Chihuahua, Tarahumara: *Bye 5604*; *pechíri*, Tarahumara, (*Bye 6123*), *péchori* (*Bye 5613*), *péchuri* (*Bye 6199*), *epéchari* (*Bye 5816*); Spanish, *cacachila* [Chihuahua, *D. Yetman, M. Kalb, N. Tadea s.n.* (ARIZ) - also the common name for *Karwinskia humboldtiana* (Schult.) Zucc., which the oak somewhat resembles (pers. comm. D. Yetman.)]. *Quercus barrancana* is used for firewood, the bark to fire "ollas" (*Bye 5604*), acorns are used in *esquiate* (*Bye 6123*), and acorns are eaten raw (a little bitter) or ground and washed before consumption (*Bye 5613*).

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Over the decades that have passed since we understood that this oak represented a new taxon, numerous people have provided help with this little, slow-birthing project. I am indebted to patient curators who sent loans long-held at NMC. Numerous students helped with field work in Mexico, all of whom were good sports and great fun to be with. Among them, particularly, were Rob Soreng, an indefatigable and enthusiastic field companion, and Jeff Bacon, a student of the oaks who could roll with the punches of field work with good humor. Colleagues Toutcha Lebgue, from the Universidad Autonoma de Chihuahua, who studies native plants of Chihuahua, James Zimmerman, a gall wasp specialist, and William Boecklen, who studied co-evolution of oaks and their parasites, the latter two individuals from New Mexico State University, were welcome participants on many trips. A good friend, Wynn Anderson, went with me on several trips to the Sierra Madre Occidental in Chihuahua and on one of them we serendipitously collected the type specimen when we were faced with fruiting trees of the new species at a rest stop. My wife, Naida Zucker, provided invaluable help with preparing the distribution map. Jennifer Thorsch facilitated a pleasant visit to USCB to view the type of *Quercus chuchuichupensis*. Guy Nesom helped with questions regarding typifying the new taxon, provided constructive comments on the manuscript, and much earlier searched for specimens of *Q. toumeyi* from western Texas that might be housed at TEX.

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**Representative specimens of *Quercus barrancana*.** Fruiting specimens are indicated by *, flowering specimens by **

**CHIHUAHUA**. Mpio. de Batopilas: S of Quirare, N of Barranca de Batopilas, ca. 1890 m elev., 27 Oct 1973, *Bye 5604* (DAV); near abandoned Milpa S of Quirare, N rim of Barranca de Batopilas, ca. 6300 ft elev., 27 Oct 1973, *Bye 5613* (ECON); old milpa, S of Quirare (2 mi along road), elev. 5900 ft., 19 Jul 1974, *Bye, Jr. s.n.* (ECON); between Basigochic and Quirare, 2165-1980 m elev., 4-6 Jan 1974, *Bye 6123* (DAV, ECON); 4 km SW of junction of Creel – Guachochi road on road down to La Bufa, 13 Sep 1986, *Spellenberg & Zimmerman 8610* (CAS, INIF, MEXU, NMC, NY)*; Loreto, 18 May 1998, *Yetman & Kalb s.n* (ARIZ); Loreto, 14 May 1998, *Yetman, Kalb, Tadea s.n.* (ARIZ). Mpio. de Chínipas: Mpio. de Guazapares – Chinipas, near ranchito Nopalero, E slope of Barranca de Chihipas, ca. 4000 ft. elev, 9 Nov 1973, *Bye, Jr. 5816* (ECON); Rancho Byerly, Sierra Charuco, 5000-5800 ft, 17-25 Apr 1948, *Gentry 8029* (ARIZ), *8148* (ARIZ); Rancho Byerly, Sierra Charuco, summer of 1946, *Maj. Langille 3* (ARIZ), *11* (ARIZ, NMC), *12* (ARIZ); Rancho Quemado (=Rancho Byerly), close to Sonoran line, 27º34'30"N, 108º41'40"W, elev. 5300 ft, 20 May 1986, *Martin s.n.* (ARIZ). Mpio. de Guachochic: KM48+5 on new Creel – Guachochic road near pass between Basihuare and Humirá, 6400 ft. elev., 12 Jan 1974, *Bye, Jr. 6211* (DAV, ECON); above pass between Basihuare and Humirá, along trail to large cave near Cuevas de las Caballos, 6500 ft. elev., 12 Jan 1974, *Bye, Jr., 6212* (DAV, ECON); 17 air mi/ 28 road mi SSE of Creel, 2 mi S of Basehuare, 107º30"W, 27º26'N, elev. 6400', 15 Apr 1984, *Spellenberg & Soreng 7719* (DAV, NMC); 40 km S of Creel, 19 km S of Cusarare, 13 km N of Humira, on road to Guachochi, 4 Oct 1986, *Spellenberg & Zimmerman* 8600 (CAS, INIF, MEXU, NMC, NY); on the Creel – Guachochic road 62 km S of Creel, 5 km S of Humira, at the crossing of the Río Urique. elev. 1610 m., 16 Jun 1993, *Spellenberg, Brouillet, & Ulaszek 11834* (MEXU, NMC, MT); 51 km S of Creel, 12 km N of crossing of Río Urique, on Mex. Hwy. 23, 27º 26", 52.6" N, 107º 29' 18.8"W (ca. 1 km S of type locality), 2025 m

elev., 28 Mar 2009, *Spellenberg & Anderson 14071* (MEXU, MO, NMC)**. Mpio. de Guerrero: San Isidro, 1768 m, 29 Jun 1970, *Pennington 23* (DAV) [municipality estimated, not given on specimen and is uncertain]. Mpio de Madera: km 279, hwy 16 to Madera, W slope of Sierra Chinaca, km 279, 108º18'53.0"W, 29º12'08.4"N, 5 Aug 1998, *Bacon, Vázquez-Villagran, & Phillips 5335* (NMC [indicated on label also to be distributed to BH, CIIDIR, F, IBUG, MEXU, MO]); est. 28 air km WSW of Madera, 35 rd. km E of the Río Tutuaca on the road to Sirupa on the road from an abandoned mining complex, Dolores. Est. 29º10'N, 108º29'W, elev. 1860 m., 19 Jun 1989, *Spellenberg, Boecklen, & Zimmerman 9799* (ARIZ, CIIDIR, MEXU, NMC, NY, TEX, RSA); est. 29 air km WSW of Madera, 22 km E of Río Tutuaca, on road to Dolores, elev. 1830 m., 19 Jun 1989, *Spellenberg, Boecklen, & Zimmerman 9806* (MEXU, NMC). Mpio. de Maguarichic: Maguarichic, 5 April 1940, *Knobloch 7094* (TEX); 34 km from the Basaseachic – San Juanito Rd, 3.5 km NE of Maguarichi, elev. 1750 m, 27 Apr 1985, *Spellenberg, Soreng, & Corral 8091* (BH, CAS, CIIDIR, MEXU, NMC)**. Mpio de Matachic: near km 9.7 of Matachic-Cocomariachic road, 1900 m elev., 29 Aug 1978, *Bye 9015* (DAV). Mpio. de Moris: near km 43 on road from Ocampo to Moris, 28.9º20'N, 108º27'20"W, 5 Jul 1985, *Martin & Duek s.n.* (ARIZ)*; 1 mi E of El Pilar, 17 mi W of Moris, elev. 4900 ft., 14 Sep 1987, *Spellenberg & Jewell 9391* (CAS, MEXU, NMC, NY)*; 4 road mi E of Moris, 16 mi W of Ocampo, 14 Sep 1987, *Spellenberg & Jewell 9400* (CIIDIR, MEXU, NMC). Mpio. de Ocampo: Parque Nacional Cascada de Basaseachi, 28º 10", 23" N, 108º 14' 01"W, 2000 m elev., 7 Oct. 2009, *Joe & Cortes 1140* (NMC); Candameña Barranca transect on road from Cruz Verde to Candameña River, 18 Mar 1988, *Donohoe 58* et al. (ARIZ); Basaseachic Falls, S rim overlook, 2000 m elev., 28º 09'10"N, 108º12'40"W, 6 Jul 1985, *Martin s.n.* (ARIZ); Ocampo mine site, 28º10'40"N, 108º22'40"W, 1800 m elev., 25 Jun 1986, *Martin s.n.* (ARIZ)**; Cascada de Basaseachic, headwaters of the Rio Mayo, 28º 10' 20"N, 108º13'W, elev. 1900 m, 25 Feb 1987, *Martin et al., s.n.* (ARIZ); along drainage of Rio Basaseachic at Cascada de Basaseachic, ca. 1 mi S of village of Basaseachic, elev. ca 2000 m., 14 Oct 1984, *R. & M. Spellenberg 7903-A* (DAV, MEXU, NMC, NY); Parque Nacional de Cascada Basaseachic, elev. ca. 1800 m, 4 Oct 1986, *Spellenberg, Soreng, Corral, & Lebgue 8830* (NMC); Parque Nacional de Cascada Basaseachic, elev. ca. 1800 m, 25 Apr 1987, *Spellenberg, Corral, & Columbus 9071* (NMC)**; Parque Nacional Cascada de Basasechic, near campground above falls, 1 Aug 1988, *Spellenberg 9643-C* (NMC); Pinos Altos, ca. 15 air km NNE of Ocampo, elev. 2100 m., 22 Jun 1989, *Spellenberg, Boecklen, & Zimmerman 9827* (MEXU, NMC); ca. 150 m below Cruz Verde (rim of the barranca) on the old road from near Huajumar to Candameña, elev. 1675 m., 27 Jun 1991, *Spellenberg & Martin 10817* (MEXU, NMC)*; Cruz Verde (rim of the barranca) on the old road from near Huajumar to Candameña, 108º17' W, 28º06' N, elev. 1950 m, 25 Jun 1991, *Spellenberg & Martin 10827* (ARIZ, MEXU, NMC); ca. 8 km by winding road E of Ocampo, 108º19'W, 28º11"N, elev. 2060 m, 25 Sep 1991, *Spellenberg, Boecklen, & Gregory 10907* (CIIDIR, NMC); Parque Nacional de la Cascada de Basaseachic, elev. 1980 m., *Spellenberg, Boecklen, & Gregory 10925* (NMC). Mpio. de. Temósachic: Nabogame, 28º30'N, 108º30'W, elev. 1800 m, 28 Jul 1987, *Laferriére 541* (NMC)*; Río Cocheño crossing, Hwy. 16, 28º 21'N, 108º19'W, 1550 m elev., 15 Aug 1987, *Martin, Krzyzanowski, & Martin s.n.* (ARIZ) same locality and date, *Martin et al., s.n.* (ARIZ); ca. 45 km due W of Cd. Guerrero, Sierra Chuchupate, 2.5 mi NE of Tosanochic, 107º59'W, 28º30'N, 13 Apr 1984, *Spellenberg & Soreng 7685* (DAV, NMC); 27 km W of jct. of road to Ocampo with Basaseachic – Yepachic road, on road to Yepachic. elev. 1800 m., 22 Jun 1989, *Spellenberg, Boecklen, Zimmerman 9831* (CAS, CIIDIR, MEXU, NMC, TEX), Chihuahua, Mpio. de Temósachic, 14 km E of Sonora border, 28º27'N, 106º26'W, elev. 1645 m., 23 Jun 1989, *Spellenberg, Boecklen, & Zimmerman 9853.1* (ASU, BRIT, CIIDIR, MEXU, NMC, NY, TEX, US). Mpio. de Urique: S side of bridge over Rio Urique, between Humirá and Napuchi, elev. ca. 5100 ft, 12 Jan 1974, *Bye, Jr. 6169* (ECON), *6179* (ECON); Mpio de Urique – Guachochi, N rim of Barranca del Cobre, between Humirá and Divisadero, ca. 5900 ft. elev., 12 Jan 1974, *Bye, Jr. 6197* (ECON), *6199* (ECON); km 627.3 road to Urique, elev. 1880 m, 107°56'31.1"W, 28°56'31.1"W, 7 Aug 1998, *Bacon, Vázquez-Villagran, & Phillips 5382* (NMC [indicated on label also to be distributed to BH, CIIDIR, MEXU]); km 775 on

road from Bahuichivo to San Rafael, elev. 2330 m, 107º30'08.3"W, 27º31'39.6"N, 7 Aug 1998, *Bacon, Vázquez-Villagran, & Phillips 5382* (NMC [indicated on label also to be distributed to BH, CIIDIR]). **SONORA**. Mpio. de Alamos: 1 km E of El Chiribo, 27º 18' N, 108º 42' W, 20 Aug 1991, *Martin & Yetman s.n.* (ARIZ); 39.2 km ENE of Alamos (by road), 3.1 km below (SW) Rancho Santa Barbara, 27º 06' 47" N, 108º 44' 13" W, 1310 m elev., 15 Jan 2008, *Sánchez-Escalante s.n.* (NMC): same site, 7 Oct 2006, *Martin s.n.* (ARIZ); same site, 7 Oct. 2006, *Reina G. et al. 2006-1275* (NMC). Mpio. de Yécora: 33 km W of Maycoba on road to Yécora, 28º 21' N, 108º 50' W, elev. 1460 m., 23 Jun 1989, *Spellenberg, Boecklen, & Zimmerman 9876* (CIIDIR, MEXU, NMC, TEX); on road between Tecoripa and Yécora, 17.6 km E of Santa Rosa toward Yécora, elev. 1525 m., 24 Jun 1989, *Spellenberg, Boecklen, & Zimmerman 9876* (ARIZ, MEXU, NMC); 5 km W of Yécora, 1645 m, 24 Jun 1989, *Spellenberg, Boecklen, & Zimmerman 9890* (BRIT, MEXU, NMC, UC)*; along Arroyo El Kipor (Quipor), Cordon Las Taunas, from El Kipor E to Tierra Panda (Las Taunas), elev. 1740 m, 10 Sep 1995, *Van Devender 95-989 with Reina G. & Fourns* (ARIZ).

**Specimens intermediate between *Quercus barrancana* and *Q. toumeyi.*** Leaves mostly entire, often small, but with a few contorted hairs.

**CHIHUAHUA**. Mpio. de Madera: km 279, hwy 16 to Madera, W slope of Sierra Chinaca, km 279, elev. 1920 m, 108º18'53.0"W, 29º12'08.4"N, 5 Aug 1998, *Bacon, Vázquez-Villagran, & Phillips 5336* (NMC [indicated on label also to be distributed to BH, CIIDIR, IBUG, MEXU, MO]); km 279, hwy 16 to Madera, W slope of Sierra Chinaca, km 279, elev. 1920 m, 108º18'53.0"W, 29º12'08.4"N, 5 Aug 1998, *Bacon, Vázquez-Villagran, & Phillips 5336* (NMC [indicated on label also to be distributed to BH, CIIDIR, MEXU]); km 280.5, hwy 16 to Madera, W slope of Sierra Chinaca, km 280.5, elev. 1940 m, 108º19'02.3"W, 29º12'27.5"N, 5 Aug 1998, *Bacon, Vázquez-Villagran, & Phillips 5339* (NMC [indicated on label also to be distributed to BH]); 25 mi s.w. of Chuhuichupa, on trail to el Rio Bonito; common with the species, shrub form of #3600, 2 Oct 1939, *Muller 3601A* (LL); same locality, tree form of #3601, common with the species, *Muller 3601B* (LL); 29 mi SW of Chuhuichupa on trail to el Rio Bonito, shrub to 6 ft. or small tree to 6 in. x 15 ft. with scaly soft grey bark, abundant locally on dry open ridge tops on w. slope of the Sierra Madre, 2 Oct 1939, *Muller 3601* [Muller's IDs on 3601, 3601A, and 3601B are all *C. chuchuichupensis* C. H. Mull. Note that even though the Muller specimens cited above may be considered intergrades, the holotype (USCB!) and isotype (TEX!) of *Q. chuchuipensis* have entire (rarely 1 tooth on a side), narrowly acute and apiculate, proportionately narrow (30x10 mm to 21x7 mm) leaves with slightly undulate margins, the abaxial surface with only sparse, golden, vermiform hairs, and are considered to be "good" *Q. toumeyi*; Sierras W of Chuhuichupa, 28 Aug 1936, *LeSueur Mex-525*]. Mpio de Temósachic: 11 km W of Yepachic, ca. 14 km E of Sonora border, 28º27'N, 106º26'W, 23 Jun 1989, *Spellenberg, Boecklen, & Zimmerman 9853.2* (CIIDIR, MEXU, NMC, NY, TEX) [this population had intergrades to *Q. oblongifolia* (see below), and also has "good" Q. *barrancana, Spellenberg, Boecklen, & Zimmerman 9853.1* (ASU, BRIT, CIIDIR, MEXU, NMC, NY, TEX) and *Q. toumeyi, Spellenberg, Boecklen, & Zimmerman 9853.3*; (CIIDIR, MEXU, NMC, NY, TEX). **SONORA**. Mpio. de Yécora: Maicoba, 1675 m, 29 Jun 1958, *Pennington 106* (DAV); Maicoba, 1675 m, 9 Jul 1968, *Pennington 162* (DAV); 7.7 km W of Maycoba on road to Yécora, elev. 1465 m, 23 Jun 1989, *Spellenberg, Boecklen, & Zimmerman 9869* (BRIT, MEXU, NMC) [collection mixed, with "good" *Q. barrancana* and a few plants that are close to *Q. toumeyi*]; 10.3 km W of Restaurant Puerto de la Cruz, 11.6 km E of Santa Ana road on Mex 16, 28º22'19" N, 109º04'58" W, 1380 m elev., 31 Mar 1997, *Reina G. 97-462 with Van Devender* (NMC) [leaves proportionately narrow (3.1:1) like many *Q. toumeyi*, but with spirally contorted hairs].

**Specimens intermediate between *Quercus barrancana* and *Q. oblongifolia***

**CHIHUAHUA.** Mpio. de Temósachic: 14 km E of Sonora border, 28º27' N, 106º26' W, elev. 1645 m., 23 Jun 1989, *Spellenberg, Boecklen, & Zimmerman 9853* (ARIZ, MEXU, NMC, TEX)

[leaves oval and relatively large for *Q. barrancana*, entire, but with glandular vermiform hairs and sparse, scattered crumpled multi-branched hairs]. **SONORA.** Mpio de Yécora: rock near Los Llanitos, elev. 1600 m, 18 Mar 1992, *Martin et al. s.n.* (ARIZ) [leaves oval or ellipsoid, entire, relatively large]; 22 km W of Yecora on Mex. Hwy. 16, 8 km W of Puerto de la Cruz, 28º51'28.6" N, 109º04'58.8" W, 2117 m elev., 26 Apr 2005, *Spellenberg & Herrick 13512* (MEXU, NMC, NY, USON) leaves slightly obovate or oblong, very few branched hairs, margins entire].

Figure 1. Habitat of *Quercus barrancana* along the Río Urique, looking upstream from the Creel – Guachochi highway bridge. The oak forms the yellowish green vegetation on the SW-facing slope on left of photograph. Trees are bearing new spring leaves (photo 8 Mar 2012).


Figure 2. Photo of unmounted holotype of *Quercus barrancana* to be sent to NY (*Spellenberg and Anderson 13487*).

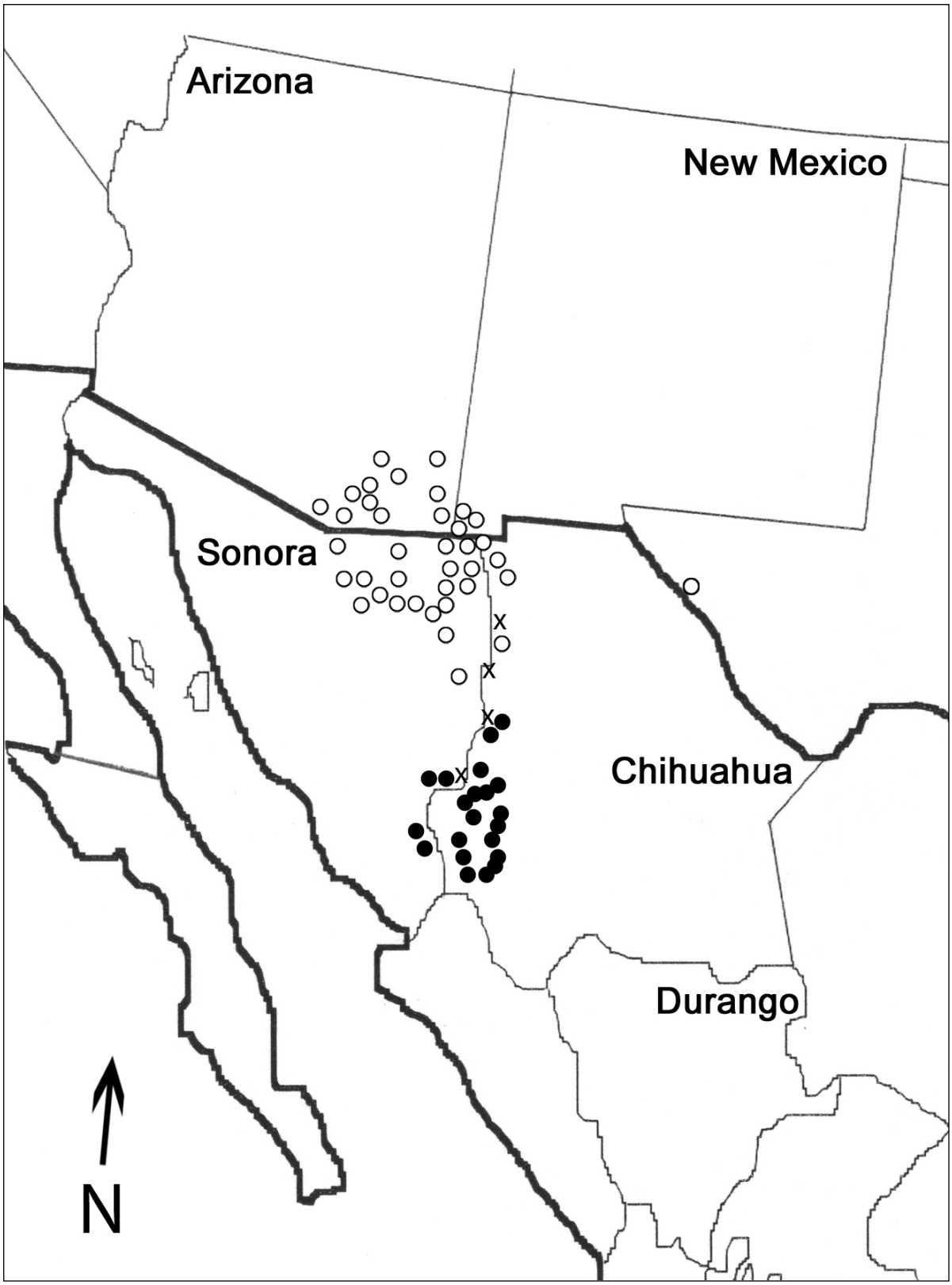


Figure 3. Map of distribution of *Quercus barrancana* and *Q. toumeyi* in southwestern USA and northwestern Mexico. Closed circles = *Q. barrancana*, open circles = *Q. toumeyi*, × = intermediate specimens between the species. See discussion in the section "Geographic Range" regarding *Q. toumeyi* in Texas.

Figure 4. Habit and habitat of *Quercus barrancana*. Trees are about 3-5 m tall, growing on thin soil over igneous rock along the Río Urique, Chihuahua (photo 8 Mar 2012).

Figure 5. Leaves of *Quercus barrancana*, showing the characteristic broad, slightly obovate shape, toothed margins, and dark green mature color. (Photo 23 Sep 2012, at the type locality; courtesy of Wynn Anderson).


Figure 6. Variation in leaf size and shape within a population of *Quercus barrancana*. Each of the twigs on the specimen is from a different tree. Population is located about 10 km N of type locality (*Spellenberg and Zimmerman 8600*). Herbarium specimens from trees with leaves similar to those on twig at lower left were occasionally identified as being introgressed with *Q. arizonica*.

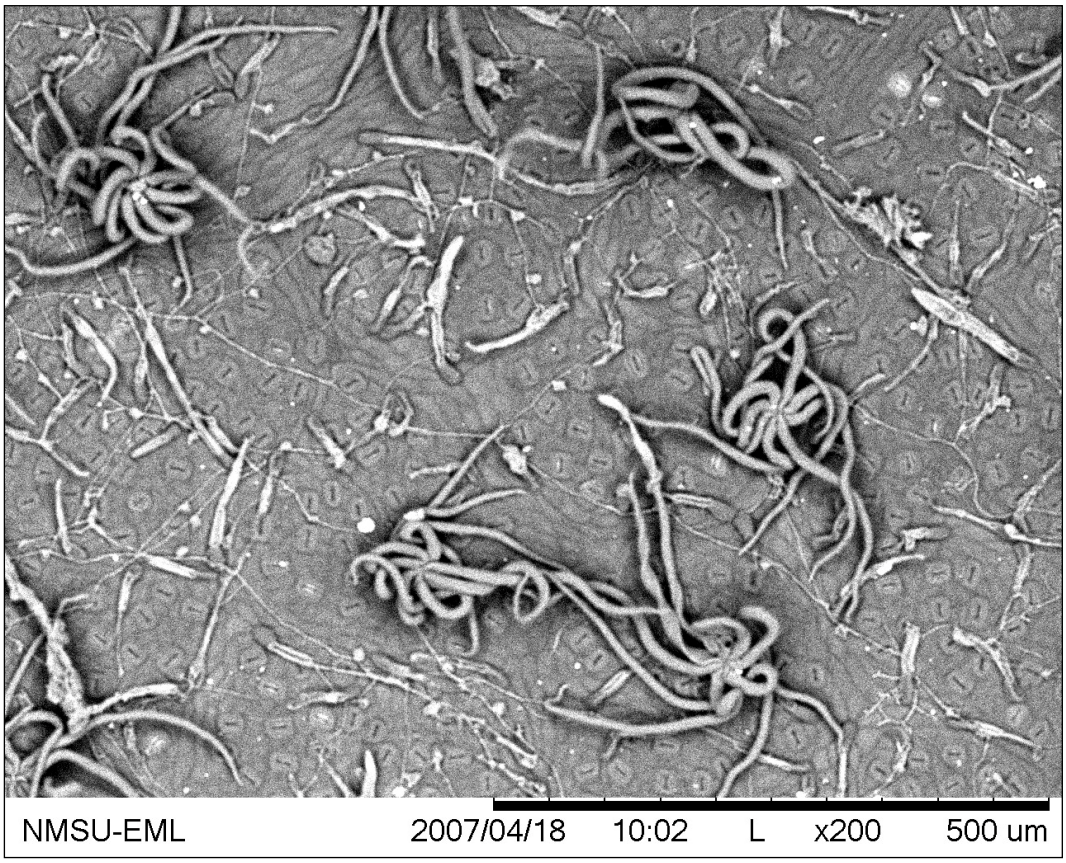


Figure 7. Scanning electron micrograph of abaxial surface of leaf of *Quercus barrancana* showing spirally contorted multirayed hairs, and smaller unbranched vermiform hairs. Leaf was collected in 2006 from a plant in type population, fixed in FAA (formalin, 95% ethanol, acetic acid, 2:1:1), stored in 70% ethanol, and viewed with a Hitachi TM-1000 scanning electron microscope.

Figure 8. An acorn of *Quercus barrancana* from the holotype. Distance from the tip of the nut to the edge of the involucre is 14 mm. Photo also shows slightly obovate, marginally toothed leaves, with paler abaxial surfaces.