# International Oaks

## The Journal of the International Oak Society

*…new species from Mexico, measuring the pace of evolution, the fabulous history of folk taxonomy, the oak-loving birds of India, amblings in Italy…*

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# *International Oaks* Issue No. 32

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**For contributions to *International Oaks***
contact
Béatrice Chassé
pouyouleix.arboretum@gmail.com or editor@internationaloaksociety.org

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***Photos.*** Cover: Béatrice Chassé (*Quercus depressa*, Arboretum des Pouyouleix, France). Page 7: Tim Boland (*Q. alba*, Chilmark Pond, MA, USA). Page 9: Gérard Lionet.

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# Table of Contents

ERRATA – Issue No. 31

Page 117: currently accepted nomenclature for *Q. liebmannii* is *Q. liebmannii*.
Pages 6, 11, 161: correct spelling of the author's name is Josef Souček.

# A New Interpretation of Mexico's Racemose Red Oaks

**Ross A. McCauley**
Department of Biology, Fort Lewis College
1000 Rim Drive
Durango, Colorado 81301, USA
*mccauley_r@fortlewis.edu*


**Herbarium specimen of *Quercus huicholensis.***

## *Introduction*

***1a***

*Quercus* section *Lobatae* subsection *Racemiflorae* is a small section of Red Oaks united by the unique characteristic of producing acorns on racemose infructescences native to the Sierra Madre Occidental and southern Cordillera of Mexico. The group has been treated in a variety of ways since first recognized by Trelease in 1921. Species recognition is difficult in the absence of reproductive material that is often not collected, a fact that led to much misinterpretation of species and distributions. In 1996, Spellenberg and Bacon completed a systematic revision of the group, recognizing four species with distinct geographic ranges segregated by slight morphological differences and edaphic factors. These included three specialists on highly sterile, often mineralized soils: *Q. radiata* in the southern Sierra Madre Occidental, *Q. tarahumara* in the northern Sierra Madre Occidental, and *Q. urbani* in the southern Sierra Madre Occidental and in an area north of the Balsas Depression in central Mexico. The fourth species, *Q. conzattii*, was shown to occur on a variety of generalist soils in the mountains of Oaxaca and in the southern Sierra Madre Occidental. This treatment greatly increased our understanding of the group and also proposed unique bicentric distributions for both *Q. conzattii* and *Q. urbani* across the Trans-Mexican Volcanic belt with the ranges separated by up to 850 km.

I began my work with subsection *Racemiflorae* in 2005, specifically to understand the patterns of species diversification and historical biogeography in a distinct lineage of *Quercus* within one of the hotspots of oak diversity. I published the main results of the work, a molecular phylogeographic and population genetic study in 2019 (McCauley et al. 2019) showing that geographic location and restriction to specific soil types principally delineated taxon groups. It failed to support the notion of bicentric distributions for any of the taxa. Using this improved understanding of speciation led me to rework the taxonomy to better follow evolutionary patterns (McCauley and Oyama 2020) to now recognize the subsection as a group of six distinct taxa. This change necessitated the resurrection of one name and the description of a new taxon.


**Photos 1/ Infructescences in two species of subsection *Racemiflorae*: (a) *Quercus tarahumara*; (b) *Q. urbani*.**

## *Key to the species of* Quercus *section* Lobatae *subsection* Racemiflorae

1. Abaxial surface of leaves conspicuously and loosely tomentose with stipitate-fasciculate trichomes, the pubescence pale yellowish gray, tawny-gray, or gray; occurring north or south of the Trans-Mexican Volcanic Belt…(2)

1′. Abaxial surface of leaves at most sparsely tomentose at maturity with stipitate-fasciculate trichomes, and commonly with small dark globules of excrescence from uniseriate trichomes, or with dense golden brown uniseriate, glandular trichomes, occurring north of the Trans-Mexican Volcanic Belt…(5)

2. Most leaf blades 15 cm long or less; infructescences 1–1.5 cm in diameter, 0-6 cm long; occurring generally on dry, rocky igneous slopes…(3)

2′. Most leaf blades more than 15 cm long; infructescences 2–2.5 cm in diameter, 4–18 cm long; occurring generally on sterile, mineralized soils…(4)

3. Abaxial leaf pubescence golden brown to pale grayish brown; infructescences 2–80 mm long; occurring in the mountains of Oaxaca and southern Puebla…***Quercus conzattii***

3′. Abaxial leaf pubescence pale gray; infructescences 0–40(58) mm long; occurring in the Sierra Madre Occidental in central and southern Durango, eastern Nayarit, northern Jalisco, and southwestern Zacatecas…***Quercus huicholensis***

4. Plants from southern Edo. de México and northern Guerrero…***Quercus urbani***

4′. Plants from southwestern Durango and eastern Sinaloa…***Quercus pennivenia***

5. Infructescences 4–12 cm long; abaxial surface of leaves at first moderately tomentose, becoming more or less glabrate and with dark globules of coalesced glandular excrescence; occurring on whitish compacted volcanic ash in southern Durango, northern Jalisco, eastern Nayarit, and western Zacatecas…***Quercus radiata***

5′. Infructescences 1–3 cm long; abaxial surface of leaves at first golden brownish from dense covering of uniseriate glandular trichomes, later becoming glabrate and with dark globules of coalesced glandular excrescence; occurring on hydrothermically altered soils or rarely on compacted volcanic ash in southwestern Chihuahua, northern Durango, northeastern Sinaloa, and eastern Sonora…***Quercus tarahumara***

## *Descriptions*

***Quercus conzattii*** Trel. is a tree to 10 m tall growing across a wide range of the mountains of southern Mexico in Oaxaca and southern Puebla. It occurs on a variety of igneous-derived soils and grows in savannah-like stands or in mixed oak-pine communities. The species has the smallest leaves of the group ranging from 7–15 cm long. Hybridization is common with a number of co-occurring species making identification challenging in mixed stands without reproductive material.

**Photo 2/ *Quercus conzattii*, Tlaxiaco, Oaxaca.**

***Quercus huicholensis*** R.A. McCauley is very similar to *Q. conzattii* and was viewed as conspecific with that species by Spellenberg and Bacon (1996). While morphologically similar, it is genetically distinct and differs by having pale gray as opposed to golden brown to grayish brown abaxial leaf pubescence and having on average shorter infructescences than *Q. conzattii* in southern Mexico. The species occurs on a variety of substrates in open

oak-pine forest or oak savanna at the southern end of the Sierra Madre Occidental from northern Jalisco to south-central Durango. Like *Q. conzattii*, *Q. huicholensis* has been found to hybridize frequently in mixed-oak stands. This name for this new species is derived from the small mountain range, Sierra de los Huicholes occurring across the area in northern Jalisco from which the type specimen was collected and in recognition of the Huichol people (Wixáritari) who inhabit areas of Nayarit, Jalisco, Zacatecas, and Durango where this species occurs.

**Photo 3/ *Quercus huicholensis*, near Villa Guerrero, Jalisco.**

***Quercus pennivenia*** Trel. is a taxon with a bit of a complicated history. It was first proposed by Trelease (1924) but not initially placed in *Racemiflorae* due to uncertain affinities, as the type, collected by Seemann in 1849, was solely vegetative. The name was most frequently used to refer to an assemblage of different taxa from the northern Sierra Madre Occidental later referred to *Q. mcvaughii*, *Q. tarahumara*, and *Q. urbani*, under which the name was eventually placed in synonomy (Spellenberg et al. 1995). Morphologically *Q. pennivenia* is essentially indistinguishable from *Q. urbani*, however genetic data shows it to be quite distinct, representing a natural evolutionary lineage. Seemann's type therefore can be applied to this distinct lineage. *Quercus pennivenia* is a tree to ca. 8 meters tall occurring in oak-pine forest on mineralized, often reddish soils in eastern Sinaloa and southwestern Durango. It can have some of the largest leaves of the group ranging from 15–38 cm long. In the northern part


**Photos 4/ (a) Habitat of *Quercus pennivenia*, near Pueblo Nuevo, Durango; (b) the author with a specimen of *Q. pennivenia*.**

of its range in Sinaloa it intergrades with *Q. tarahumara* from which it can be differentiated by its mature infructescences growing up to 17 cm long.

***Quercus radiata*** Trel. is a tree to 9 m tall growing in mixed oak and oak-pine forest in the southern Sierra Madre Occidental in southern Durango, northern Jalisco, and Zacatecas. It can occur in close proximity to *Q. huicholensis* and has often been misinterpreted as *Q. urbani* or *Q. pennivenia* due to the similarly shaped leaves which can be as long as 25 cm, however it is a specialist on compacted volcanic ash deposits at generally higher elevation and lacks the dense abaxial leaf pubescence of the two other species.

**Photo 5/ *Quercus radiata*, near Tenzompa, Jalisco.**

**Photo 6/ *Quercus taharamara*, Yepachi, Chihuahua.**

***Quercus tarahumara*** R. Spellenberg, J. Bacon & D. Breedlove is a tree to 12 m tall described by Spellenberg *et al*. in 1995. It had been included within the heteromorphic *Q. pennivenia* but was found to be distinct based on its unique short and dense infructescences. The species occurs on reddish, likely hydrothermically altered soils centered in the region of the Copper Canyon occurring in western Chihuahua, northeastern Sinaloa, northwestern Durango and northeastern Sinaloa and was named for the indigenous inhabitants of the region.

***Quercus urbani*** Trel. is a tree to 13 m tall growing in mostly monospecific stands surrounded by mixed oak and oak-pine forest. It occurs on sterile and probably hydrothermically altered igneous soils which underlie its habitat islands. While morphologically indistinguishable from *Q. pennivenia*, *Q. urbani* occurs in an area north of the Balsas Depression in northern Guerrero and Estado de México with particular abundance in the small Sierra de Nanchititla, Sierra La Goleta, and north of the town of Taxco.

**Photo 7/ *Quercus urbani*, near Taxco, Guerrero.**

***Photographers.*** Photos 1-7: Ross A. McCauley.

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