



A new species of *Ceanothus* (Rhamnaceae) from Sierra Madre Occidental, Mexico

JOSÉ A. VILLARREAL-QUINTANILLA^{1*}, EDUARDO ESTRADA-CASTILLÓN² & JUAN A. ENCINA-DOMÍNGUEZ³

¹Universidad Autónoma Agraria Antonio Narro, Departamento de Botánica, Buenavista, Saltillo 25315, Coahuila, México.

E-mail: javillarreal00@hotmail.com

²Universidad Autónoma de Nuevo León, Facultad de Ciencias Forestales, Apartado postal 41, Linares, 67700, Nuevo León, México.

³Universidad Autónoma Agraria Antonio Narro, Departamento de Recursos Naturales Renovables, Buenavista, Saltillo 25315, Coahuila, México.

*Author for correspondence

Abstract

Ceanothus fernandezii is described as a new species in the subgenus *Ceanothus* from the Sierra Madre Occidental in the Mexican state of Durango. It differs from known species of *Ceanothus* for having rigid secondary branches with elliptic to ovate leaves with three veins at the base and a pubescent lower surface, white flowers and smooth fruit. Description, photographs, a key and a distribution map are presented for the new species.

Keywords: *Ceanothus fernandezii*, Durango, taxonomy

Resumen

Se describe *Ceanothus fernandezii* como especie nueva del subgénero *Ceanothus* a partir de material proveniente de la Sierra Madre Oriental en Durango. Difiere de las especies conocidas de *Ceanothus* por presentar ramas secundarias rígidas con hojas elípticas a ovadas con tres venas en la base y envés pubescente, flores blancas y fruto liso. Se presenta una descripción, fotografías, clave y mapa de distribución de la especie nueva.

Introduction

The genus *Ceanothus* comprises 55 species of North American shrubs and small trees. Two subgenera are recognized: *Ceanothus* and *Cerastes* (S. Watson) Weberbauer (1896: 414) (Burge & Zhukovsky 2013). The Pacific coast concentrates most of the species where California is considered a center of diversity (Jeong *et al.* 1997). In Mexico 21 species are reported, most of them (10) are located within Baja California Norte (Fernández 1993; Villaseñor 2016).

The genus is characterized for a highly variable morphology making the taxonomy a challenge, the identification frequently requires of a combination of characteristics of the different organs of the plant (Wilken 2006). The revision of herbarium material has revealed some specimens that do not fit with the previous known species of the genus.

Materials and Methods

For morphological purposes, ten samples of *Ceanothus oliganthus* Nutt. var. *orcuttii* (Parry) Trel. ex Jepson (1925: 621), *C. tomentosus* Parry (1889: 190) and *C. fernandezii* were randomly selected. Material was examined by using a Rossbach Kyowa stereo dissecting microscope. The specimen samples were subjected to meticulous morphological scrutiny in the herbarium using specialized literature for the genus (Fernández 1993, Fross & Wilken 2006). The samples of the new species revealed that they did not coincide with any of the previously described species, according to the taxonomy of Fross & Wilken (2006).

Taxonomy

Ceanothus fernandezii Villarreal, A.E. Estrada & Encina *sp. nov.* (Figs. 1–2).

Type:—MÉXICO. Durango: Municipio de Canelas, 1200 m al E de Canelas, bosque de ensino, 28 December 1985 (fl.), *M. Viscarra 150* (holotype MEXU; isotypes [to be distributed] ANSM, CIIDIR, CFNL, ENCB).

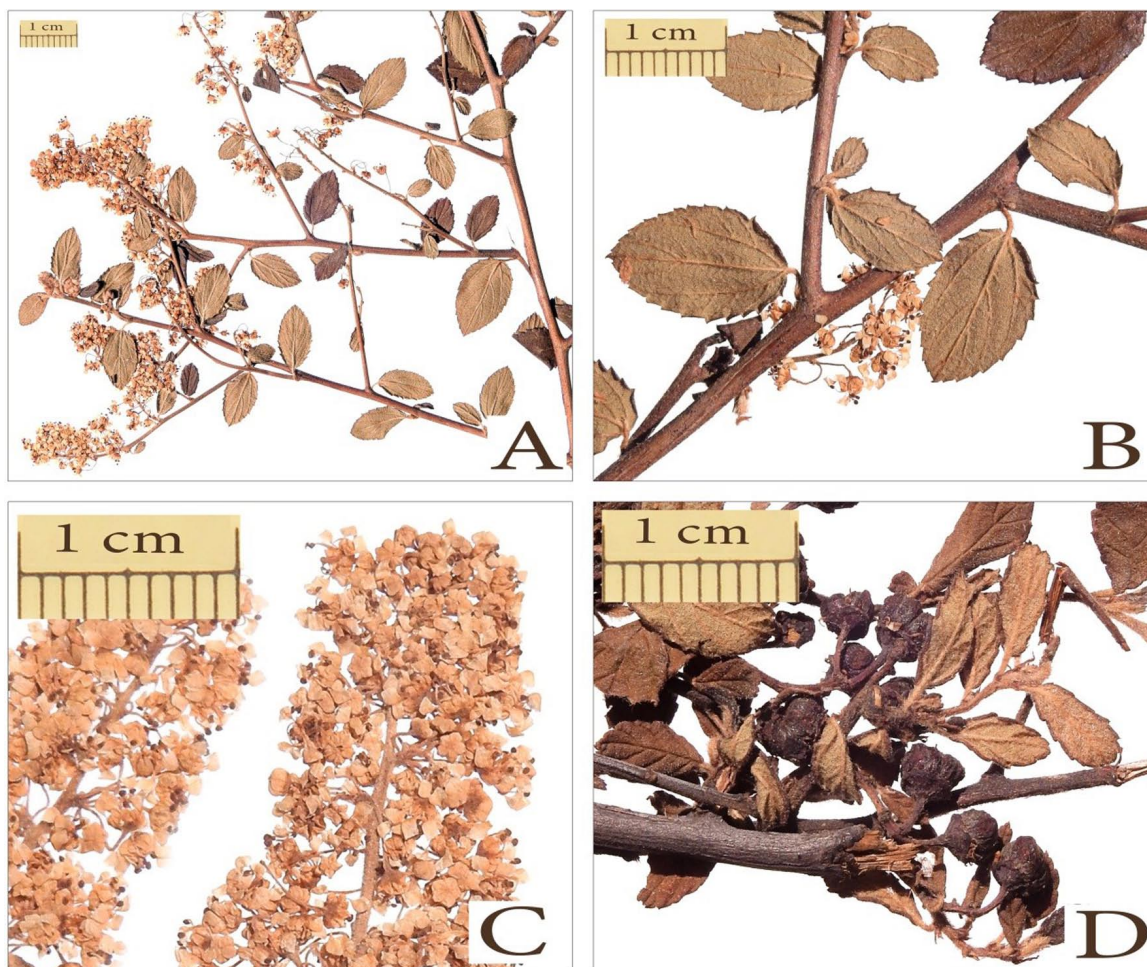


FIGURE 1. *Ceanothus fernandezii*. A. A branch of the plant. B. Detail of the leaf. C. Inflorescence close up. D. Fruits. Photos by Gilberto Araiza. A–C, *M. Viscarra 150*, and D, *S. González E. 3040*.

Morphologically similar to *Ceanothus tomentosus* Parry, but with rigid secondary branches diffuse to ascending, lower leaf surface pubescent, white flowers, and occurring in the Sierra Madre Occidental.

Shrubs unarmed, deciduous, 50–120 cm tall; main branches rounded to slightly striated, long and straight, brown; secondary branches diffuse to ascending, 1–2 mm thick, scattered pubescent, the trichomes single and appressed. Leaves with petioles 0.5–2 mm long; stipules persistent; blades elliptic to slightly ovate, 12–18 × 6–12 mm, yellow-brownish, villous, base rounded, margin with 10–15 lateral small teeth mucronulate, sometimes revolute, apex acute to slightly obtuse, coriaceous, 3 veined from the base, 3–4 pairs of almost straight secondary veins, discolorous, green above, with scattered single appressed trichomes, veins glabrous or almost glabrous, green-yellowish beneath, pubescent with appressed trichomes mainly on the veins. Lateral stems and branchlets terminating in elongate racemes of umbels, 1–4 cm long; floral bracts, oblong, 4–8 mm long, greenish, densely pubescent; peduncles 8–18 mm long, pedicels 3–5 mm long, greenish, densely pubescent. Flowers 4–4.5 mm in diameter, calyx campanulate, the tube 1 mm long, pubescent, the petaloid lobes, obovate, 1 mm long, petals clawed, 1.5–2 mm long, white, glabrous, stamens exerted, 2 mm long, anthers blue, ovary glabrous. Fruit spheroidal, 4–5.5 × 4–5 mm, smooth, glabrous; seeds 3.

Distribution, habitat and phenology:—*Ceanothus fernandezii* occurs in scattered populations in the Sierra Madre Occidental region, including the eastern and southern Durango state and probably also in the nearest area with Zacatecas, Jalisco and Nayarit states. Grows mainly in oak and pine woodland and occasionally in xerophytic shrubland, from 1200 to 2500 m of elevation. The area is dominated by an oak community consisting mainly of *Quercus emoryi*

Torrey (1848: 9), *Q. arizonica* Sargent (1895: 89), *Arctostaphylos pungens* Kunth (1818: 278) and *Pinus cembroides* Lindley (1839: 62). Flowering time ranges from July to December, and fruiting occurs from September to February.

Eponimy:—The specific epithet is name for Rafael Fernández Nava, an excellent botanist and student of the Rhamnaceae in Mexico, and editor of the journal *Polibotanica*.

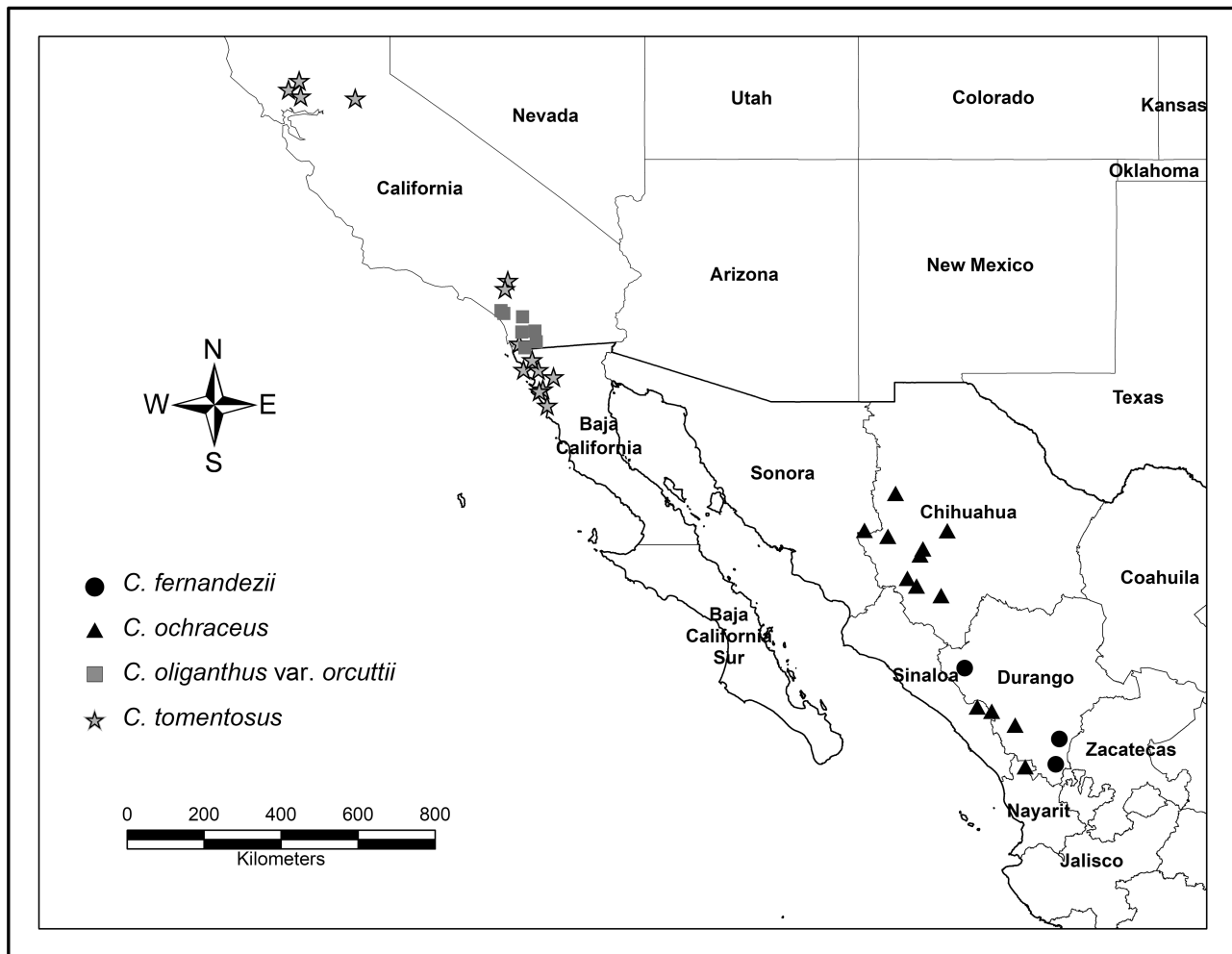


FIGURE 2. Distribution of four species of *Ceanothus*.

Additional specimens examined:—MEXICO. Durango: Municipio El Mezquital, camino Agua Zarca-Temohaya, 11 August 1982 (fl.), *M. González E.* 460 (ANSM!, CIIDIR); Municipio El Mezquital, 23 km de Temohaya, por el camino a Mezquital, alt. 2300 m, 2 October 1984 (fr.), *S. González E.* 3040, *M. González E. & J. Rzedowski R.* (to be distributed: ANSM!, CIIDIR!, CFNL!, ENCB!, MEXU!).

Discussion:—The new species belong to the subgenus *Ceanothus*, which includes mostly evergreen plants, with alternate leaves, hornless fruits, thin early-falling stipules, and leaves with stomata on the lower surface (Jeong *et al.* 1997). It is morphologically similar to *C. tomentosus* from California and Baja California. Both species have rigid secondary branches, with 1–2 mm diameter, and oblong, elliptic to ovate leaves with three main veins at the base. However, *C. fernandezii* differs by having secondary branches diffuse to ascending, pubescent lower leaf surface and white flowers (Table 1). Additionally, *C. fernandezii* occurs in the Sierra Madre Occidental in Durango and probably in the closer area of Nayarit, Zacatecas and Jalisco, in temperate woodlands at 1200–2500 m of elevation. In contrast, *C. tomentosus* has secondary branches divergent, lower surface tomentose, pedicels blue and glabrous and blue flowers; it is growing in dry hills and low mountains with chaparral in California and northern Baja California at 100–1600 m of elevation.

Ceanothus fernandezii is also close related to *C. oliganthus* var. *orcuttii* with very similar leaves but with 20–70 marginal teeth (*vs.* 10–15), pedicels blue and glabrous (*vs.* greenish and pubescent), blue or purple flowers (*vs.* white), hairy ovary (*vs.* glabrous) and fruit surface wrinkled (*vs.* smooth). The distribution and habitat is the same that *C. tomentosus* (Table 1).

TABLE 1. Comparison of selected characters of *Ceanothus fernandezii*, *C. oliganthus* var. *orcuttii* and *C. tomentosus*.

Character	<i>Ceanothus fernandezii</i>	<i>C. oliganthus</i> var. <i>orcuttii</i>	<i>C. tomentosus</i>
Secondary branches position	diffuse to ascending	ascending	divergent
Branches	rigid	flexible	rigid
Petiole (mm)	0.5–2	3–7	0.5–3
Marginal teeth	10–15	20–70	20–50
Lower leaf surface	pubescent	pubescent	tomentose
Floral bracts	pubescent	glabrous	glabrous
Pedicel color	greenish	blue	blue
Pedicels	pubescent	glabrous	glabrous
Flower color	white	blue-purple	blue
Anther color	blue	yellow	yellow
Ovary	glabrous	hairy	glabrous
Fruit	smooth	wrinkled	smooth
Habitat	woodland	desert scrub	desert scrub
Distribution	Durango	California & Baja California Norte	California & Baja California Norte
Physiographic area	SMO	Pacific Coast	Pacific Coast

SMO= Sierra Madre Occidental

Ceanothus ochraceus Suessenguth (1940: 11) is another similar species additionally growing within the Sierra Madre Occidental, but has lanceolate leaves with one main vein at the base, lower surface tomentose, thinner secondary branches, 0.5–1 mm diameter, which are flexible and ascending, and white flowers. *C. ochraceus* grows along the Sierra Madre Occidental (Chihuahua, Sonora, Durango, Sinaloa y Nayarit), within pine-oak woodland.

Taxonomic key to separate related species.

1. Leaves lanceolate; blades with 1 main vein at the base*C. ochraceus*
 Leaves elliptic to ovate; blades with 3 main veins at the base2
2. Flowers white; leaf blades with 10–15 marginal teeth; Durango *C. fernandezii*
 Flowers blue to purple; leaf blades with 20–70 marginal teeth; California and Baja California Norte3
3. Lower leaves surface tomentose; ovary glabrous; fruit surface smooth *C. tomentosus*
 Lower leaves surface pubescent; ovary hairy; fruit surface wrinkled*C. oliganthus* var. *orcuttii*

Acknowledgments

We are grateful to Universidad Autónoma Agraria Antonio Narro (research project 40012100) for supporting botanical research and the reviewers for improving the manuscript presentation.

References

- Burge, D.O. & Zhukovsky, K. (2013) The taxonomy of *Ceanothus vestitus* complex (Rhamnaceae). *Systematic Botany* 38 (2): 406–417.
<https://doi.org/10.1600/036364413X666750>
- Fernández, R. (1993) *La familia Rhamnaceae en México*. Tesis de Doctorado. Escuela Nacional de Ciencias Biológicas. Instituto Politécnico Nacional. México, D.F., 345 pp.
- Fross, D. & Wilken, D. (2006) *Ceanothus*. Timber Press, Portland OR, 272 pp.
- Jeong, S.C., Liston, A. & Myrold, D.D. (1997) Molecular Phylogeny of the genus *Ceanothus* (Rhamnaceae) using *rbcL* and *ndhF* sequences. *Theoretical and Applied Genetics* 94: 852–857.
<https://doi.org/10.1007/s001220050486>
- Jepson, W.L. (1925) *Ceanothus*. In: *A Manual of the flowering plants of California*. pp. 619–625.
- Kunth, C.S. (1818) Voyage de Humboldt et Bonpland. *Arctostaphylos*. *Nova Genera et Species Plantarum* 3: 278–279.
- Lindley, J. (1839) Ornamental flower-garden and shrubbery. *Edward's Botanical Register* 25: 1–95.
- McMinn, H.E. (1942) A systematic study of the genus *Ceanothus*. In: Van Rensselaer, M. & McMinn, H.E. (Eds.) *Ceanothus*. Santa Barbara: Santa Barbara Botanical Garden, pp. 131–279.
- Parry, C.C. (1889) *Ceanothus*. *Proceedings of the Davenport Academy of Natural Sciences* 5 (2): 185–194.
- Sargent, C.S. (1895) The American Carnation Society I. *Garden & Forest* 8: 89.
- Suessenguth, K. (1940) *Ceanothus*. *Repertorium Specierum Novarum Regni Vegetabilis* 49: 11.
<https://doi.org/10.1002/fedr.19400490104>
- Torrey, J. (1848) *Quercus*. *Notes of a military Reconnaissance* 151: pl.9.
- Villaseñor, J.L. (2016) Checklist of the native vascular plants of Mexico. *Revista Mexicana de Biodiversidad* 87 (3): 559–902.
<https://doi.org/10.1016/j.rmb.2016.06.017>
- Werbauer, A. (1896) Rhamnaceae. *Die Natürlichen Pflanzenfamilien* 3 (5): 414.
- Wilken, D. (2006) *Ceanothus* in the wild. In: Fross, D. & Wilken, D. (Eds.) *Ceanothus*. Timber Press, Portland OR, pp. 131–246.